



THE MARINE REVIEW



VOL. 48

CLEVELAND

JULY, 1918

NEW YORK

No. 7

Learning the Game from the Inside

Government Officials Are Acquiring Knowledge of Steamship Operation That Promises Better Legislation in the Future—Railroads' Experience is a Guide

A MERICAN railroads have been directed as one system for less than six months. One is tempted to believe, however, that already a more genuine appreciation of the problems of the railroads is held in Washington than ever before. And that understanding is being acquired by those in the best position today to put that knowledge into effect. Those anxious to read into the future of the American merchant marine that success which the country's welfare demands, are hoping that the education of official Washington in transportation will be proved thorough when the operation of American steamships again becomes a big problem.

Team Work Has Been Absent

Our two systems of transportation—by land and by water—have never simultaneously enjoyed prosperity. Some of America's greatest maritime records were made, of course, in the days preceding the development of the locomotive. The days of railroad expansion were days of maritime declension. War is proving a corrective to this condition and at the same time that our merchant marine is being revived, the railroads are benefiting from remedial measures they tried vainly to secure when privately owned.

The shipping board ever since its organization has been occupied primarily with the imperative war need of rapid ship construction. This program is being carried out, the ships are being built and the prospects for an imposing freight carrying fleet in the future are bright. On the assurance of Chairman Hurley, as given on a following page, we can expect in 1920 to take first rank among the ship owning nations of the world.

Another duty equally important was imposed upon the shipping board by the law bringing the board into existence, that is, to study navigation problems and laws with a view to giving permanence to an American merchant marine. War conditions have developed a situation which the law makers could not foresee. Construction rather than supervision demanded the board's immediate attention. As a result the

board was forced to take over the direction of all large American ships and thus become a steamship operator without having had time to study the problems that others in the same position had been facing.

Preparing for Peace in Times of War

There is no reason to doubt that the experience will be beneficial both to the board and to steamship owners. A recent questionnaire conducted by the associated chambers of commerce of the Pacific coast revealed a widespread belief held by steamship operators that many remedial measures must be adopted before our merchant marine could be shifted safely from war to a peace basis. Among the recommendations suggested were: Standardization of the steamboat-inspection service; changes in measuring ships to conform with practice of other nations; reduction in number of officers and crew, especially in the engine room, on vessels of different tonnage, to conform to British requirements; legislative action to offset wage differences; change of American requirements for qualifications of officers and crews to conform to those of Great Britain; adoption of the less costly British scale of victualing ships; amendment of seamen's law particularly by eliminating provision requiring payment of one-half wages at each port, by making language requirements similar to those of competing nations and by modifying provision for licensing able seamen so as to permit competent men to qualify regardless of length of service.

An Analysis of the Board's Work

On the following page is the first detailed analysis of the shipping board's work in operating all large American steamships as one fleet. The article directs public attention to a big and imperfectly understood problem, but one which will assume greater importance.

With two federal agencies simultaneously studying and operating our major transportation systems the prospects for more enlightened legislative action at Washington are brighter than ever before.

Is Uncle Sam a Good Ship Operator?

Shipping Board Has Faced a Big Job in Taking Charge
of All Large American Vessels—What Has Been Done

By V. G. Iden

PROBLEMS of the United States shipping board today are generally talked of in terms of new ship construction. The long delays and the abundance of deserved and undeserved criticism have focused attention largely upon this phase of the board's work. As a result, another facet which will shortly outreach in importance the construction end, has engaged little of the public's interest. This is the operation of the ships, both older boats taken over and those which are now being built in increasing numbers. Uncle Sam, shipbuilder, is also Uncle Sam, steamship operator.

In the accompanying article, Mr. Iden analyzes with the keen insight of a trained Washington observer the work which the shipping board has done and must do in operating the ships efficiently. The problem has

a direct appeal to every American. Inefficient management after the ships are built can do as much to prolong the war and to aggravate the sacrifices made necessary by the war as can delays and failures in the actual construction of ships. A rise or fall of a few per cent in the efficiency of ship management spells the difference between increasing or decreasing the entire shipbuilding program by the same amount, including the pressing problems of supplying engines, auxiliaries, cranes, etc.

The accompanying article presents for the first time a comprehensive outline of the way the shipping board has carried out its big job of managing vessels and points out some of the problems which have been and must be faced and overcome.

CHAIRMAN HURLEY of the United States shipping board confessed to the newspaper correspondents recently that the United States is able to increase the ocean freight movement 20 per cent through a more efficient use of the tonnage available. This increase has been effected since last fall when the shipping board requisitioned all the vessels flying the American flag. It was effected through the very capable and self-denying service contributed by P. A. S. Franklin, New York, one of the most noted figures in the merchant marine world.

Other than making the bare statement of the increased efficiency, the shipping board head had nothing to say regarding the manner in which the government is operating vessels.

Much criticism has been heard in the past regarding the inefficient manner in which ships have been handled under government control, and it is understood that much of this criticism was justified. In an address before the members of the National Press Club of Washington, some months ago, Theodore Roosevelt cited a few instances of such inefficiency. He stated that information had come to him of vessels leaving our ports for Europe only partly loaded. In some instances vessels were dispatched to Europe with cargoes which were never unloaded but brought back to the United States after several weeks of delay. It was but natural for the administration to cover up many of these defects. Undue publicity would do much more harm than good.

But the inefficiency was not entirely covered up because the proper agencies of the government were put to work on the problem with the result that a committee on operations was created by the shipping board and Mr. Franklin placed at its head.

Inefficiency in the management of our merchant ships under federal control grew out of inexperience entirely. Much of it was laid at the doors of the war department. Army officers were said to have started vessels on their voyages without making out manifests, and, according to report, when some of these officers were asked for a manifest they declared they did not know what it was. Out of this experience grew the dispute between the shipping board and the navy regarding the manning of the American merchant marine. The navy was the most efficient agency available for operating ships, but the army hesitated relinquishing its jurisdiction.

How Ships Are Handled

Out of this dispute came the creation of a shipping agency in the navy department to which the army turned over all "bare" vessels which it had. The navy manned these vessels and operated them for the benefit of the army. This is the scheme of operation which has been followed ever since. It is the scheme of operation which is likely to continue for the remainder of the war inasmuch as it has proved very efficient, much more so than the old method where inexperienced army officers were al-

lowed to take charge of vessels requisitioned for war purposes. But the inefficiency of the old management has been greatly magnified inasmuch as the government has not allowed anything to be published concerning it. Due to the severity of the submarine program and the military necessity of veiling in secrecy the shipment of men and supplies to Europe, a strict censorship has been maintained. That this censorship has protected inefficient management of merchant ships is but an incident and not the intent of the censorship. And it would be unpatriotic today to fail to acknowledge that this inefficiency in the operation of merchant vessels has been eliminated.

The efficiency of the operation today is attested to by the number of American troops on the fighting line and the abundant supplies that the army has been able to accumulate in France.

Germany took 40 years of the most calculated attention to build up her military machine. Even with this long preparation, forethought and boasted superefficiency, the German military machine has committed blunders during the war. The United States shipping board had to improvise a vast organization both to administer and execute the stupendous program set before it.

Expert ship architects and skilled traffic and operating heads had to be obtained, and this at a time when the pressing demand for their services far exceeded their availability. Steel shipbuilding labor was scarce and

wood shipbuilding was practically a lost art. An enormous army of labor had to be secured at once and hastily trained. New and adequate traffic arrangements, involving great nationwide readjustments, had to be made.

Mistakes have, naturally, been made. It may be that the inefficient use of ocean tonnage is partly responsible for the heavy restriction placed upon American imports and exports today. The shipping board early last year selected Edward M. Carry, a business man of Chicago, to become its director of operations. This title has been a misnomer in many ways because Mr. Carry has been chiefly a director of commerce by water for the board. He has had little, if anything, to do with the highly practical and technical problem of handling a ship. He merely directed the general trend of trades. Mr. Franklin has been the efficiency genius, the man who has devised ways and means for shortening the stay of a vessel in port and for quickening its speed on its journey, and those are the things which spell efficient management.

Now Mr Carry has to be relieved of duty in his present capacity. He has been selected to head a special harbor and port commission, which is to study out the requirements of the various ports for dock and wharf facility. The shipping board is looking around for a most practical and efficient man to take the place vacated by Mr. Carry. Prompted by the success attained in the selection of Charles M. Schwab as director general of shipbuilding, it was reported that the position of director of operations had been offered to James

A. Farrell of the Steel corporation. That offer, if actually made, did not bring any results and the post is still open and is being held open until a most capable executive can be found.

Shipping Board's Biggest Need

The future success of the shipping board depends very largely upon its ability to fill the post vacated by Mr. Carry in a capable manner. This is of paramount importance. In the past, the measure of efficiency of the board was in the amount of tonnage which it could have constructed in American shipyards this year. Tomorrow it will be the efficiency of management of the ships which are built.

On April 1, 1918, there were 909 seagoing American steamers of 1000 gross tons and over, totaling 3,764,264 gross tons, and 314 seagoing sailing vessels of 1000 gross and over, totaling 517,989 gross tons. As yet the shipping board has requisitioned vessels of not less than 2400 tons, but it has in mind a plan to requisition the smaller craft so long as they are seagoing. Requisitioning presupposes efficient management of these vessels. In addition to the American vessels requisitioned, the United States has acquired by charter or by seizure a total of 376 vessels of 2,073,826 deadweight tons. This includes the 87 Dutch ships of 528,083 deadweight tons seized, 58 other neutral vessels chartered of 266,608 deadweight tons, and 112 allied vessels chartered of 502,964 deadweight tons.

One of the first things planned by

the shipping board after obtaining control of this vast tonnage, a tonnage which is vital to the war and so essential to our foreign commerce just now, was to eliminate a portion of the cargo space. It put into effect plans to double the number of compartments in all cargo ships of American registry engaged in transatlantic service and in vessels under construction. The board announced that it was believed that the changes can be made without seriously delaying the ships, and it was estimated that less than 5000 tons of cargo space will be lost to the entire fleet of vessels. The ordinary 5000-ton ship now has four compartments, and the plan is to double the number by the use of steel and wood construction, which can be put in while the vessels are afloat. From the point of view of the shipping board these alterations will make the vessels safer and less liable to damage from submarine attack. From the point of view of the shipper it means delay to the vessels while the alterations are being made, a delay at a time when speed of operation is most essential. It also means curtailment of cargo space and therefore a diminution of the available tonnage.

Ostensibly it is possible to mention but the most flagrant examples of inefficient management of merchant ships. But this question of efficient management is certain to become more and more important as ship construction increases. During May the amount of new tonnage which has been delivered to the Emergency Fleet corporation passed the 1,000,000-ton mark. Today the problem of



BOTH SIDES OF THE SHIPPING BOARD'S PROBLEM SHOWN AT A GLANCE

While constructing new ships, the shipping board must meet the shortage of officers and crews by furnishing intensive instruction at newly organized schools. The illustration shows students of the board's navigation school at Tampa, Fla., with a background of new vessels on the stocks. Nearly 800 students a term are now being trained. Navigation school term is six weeks and engineering school term, one month.

More students are needed.

providing crews and officers for these vessels becomes of increasing importance. For the past several months the representatives of the seamen's unions and other labor organizations have been in conference with ship owners and operators at the invitation of the shipping board. Recently substantial increases in wages to ship crews have been approved by the board. It appears that the experience with shipyard labor is to be repeated with merchant crews. Gold is the one solution.

Finding the Crews

The shipping board has done something at training recruits for navigating vessels. This work has been duly advertised to the public, but its results are yet to be tested. Crews will undoubtedly be found for the new vessels but not without considerable difficulty. It is probable that the board will follow the example set with shipyard labor and start a propaganda appealing to the sense of patriotism of the men to return to the sea.

Beginning with nothing and creating that vast organization it has, the shipping board has accomplished some great things. It has not as yet concentrated upon the efficient operation of vessels to the extent it has on the construction of new ships. There has been good reason why this was not necessary. It is the purpose of the shipping board to avail itself of the services of all practical steamship men in the country for the operation of its vessels. It is proposed to encourage the formation of new steamship companies and to keep in existence all present steamship companies. Merchant vessels which are not actually needed in war service will be distributed among these private American companies for operation. These companies are to operate the vessels upon a commission basis. That commission has already been fixed by the board and a circular was sent to all companies during the past few weeks informing them of this matter.

Naturally the shipping board holds the upper hand in the question of ship management, and the companies which operate ships for the board will operate them after the manner approved by the board. They must be operated in the trades determined by the board as essential. In this connection the board is co-operating with the war trade board and no restrictions on imports and exports will be imposed by the war trade board except upon the recommendation and approval of the shipping board. A system such as this gives

the shipping board a predominating place in the management of merchant vessels, but delegates to the shipping companies the duty of seeing that the vessels are efficiently managed. This system of placing vessels at the disposal of the private companies to be operated upon a commission basis has already been inaugurated.

Seeks New Powers

To make its control almost absolute, the shipping board has gone to congress for new laws. A bill has been proposed which would dictate the ownership in American companies. The purpose of this bill is to prevent any aliens obtaining interest in such companies and thereby preserving to American citizens all say in the operation of American ships. This bill would also prevent the building or the launching of any vessel for foreigners without the consent of the shipping board. In this respect it is expected the bill will prevent Germans buying up contracts with American shipyards for vessels to be built immediately after the war.

A companion bill has also been introduced in congress at the request of the shipping board which delegates the power to fix ocean freight charges and charter rates. Indirectly the board can control these matters now, but the new bill will delegate the powers more directly and therefore more efficiently. These two bills have been introduced in both the house and the senate. The house committee on merchant marine and fisheries has already filed a favorable report, and it is expected that they will be taken up shortly in the lower chamber for consideration.

These measures of control of shipping have a most important and personal effect upon American citizens. Today bananas are scarce because it has been necessary to divert merchant ships to carry troops and supplies to Europe. Imports of rubber and of rubber substitutes have been restricted and automobile tires are costly, because ship tonnage was required for the war. These scarcities in the commodities of daily use have resulted from the control of shipping which is exercised by the shipping board. Naturally the question of efficient management of the merchant marine becomes a personal problem with the American citizen.

Board Faces Big Problem

That the shipping board is fully aware of this can be recognized by persons close to the affairs of the board. Chairman Hurley is not unwilling to acknowledge the potentialities of the situation. As a matter

of fact he is keenly alive to the situation. He is doing all he can to meet the problems and to solve them before they become so great as to cause national apprehension. For instance, it is believed that there are many small vessels now in coast-wise service, and probably some on the Great Lakes and other inland waters which could be used in short ocean voyages. It might be well to establish some of these vessels in trade with the West Indies and other nearby countries and, through them, to re-establish that trade which has been temporarily lost through the demands of the war in Europe which requires the greater proportion and the larger of our fast steamships.

This control of American shipping through the shipping board is becoming almost as bureaucratic as that control of British shipping by the English government. The war is the excuse offered for the continuation of this control, and behind that public spirited citizens do not care to go. The complaints made are not that a vessel must be taken out of a particular trade, but, if taken out, she should be efficiently used in the more essential trade. The shipping board is fully aware of the complaints lodged by British shippers against British control of shipping and is trying to profit by that experience in so far as American shipping is concerned. But the experience of the British will not cause our shipping board to hesitate in doing its duty by the government, and that duty is to win the war.

Ten Years of Boiler Standardization

One of the most extensive efforts ever undertaken to effect standardization in any one line is at the present time reaching a successful climax. This great work, boiler standardization, had its inception in Massachusetts 10 years ago and has, in the intervening period, claimed the attention of thousands of engineers and required an outlay of over \$1,000,000. After the work was taken up by the American Society of Mechanical Engineers its advance was rapid under the stimulating energy of John A. Stevens and the late Col. E. D. Meier. The A. S. M. E. boiler code has at the present time been adopted by several states and many individual power plants.

The history of boiler standardization for land and marine service is interesting. It dates back to the early efforts of the Massachusetts board of boiler rules, founded mostly through the efforts of Joseph H. McNeill, which held its first meeting at the State house,

Boston, in 1907. This board formulated a standard designed primarily to insure safety. During the next four years information on boilers was collected from a wide variety of sources and bulletins were occasionally issued to boiler manufacturers and inspectors. A set of rules issued on Aug. 5, 1909, was the last and most important of the bulletins issued by the Massachusetts board.

In 1911, Col. E. D. Meier, then president of the American Society of Mechanical Engineers, suggested that the society undertake the work of standardization of steam boilers in a more

complete manner than was possible by the state of Massachusetts. A committee was accordingly appointed with John A. Stevens, who had made a comprehensive survey of boilers in Europe and America, as chairman. This committee proceeded on lines similar to those followed by the original Massachusetts board and consulted all qualified authorities, including manufacturers and users of boilers. Bulletins showing the status of the work were published periodically.

At the present time the A. S. M. E. code specifies in detail the chemical and

physical properties of all material entering into the construction of boilers, and gives rules, formulas and tables which have been checked and rechecked by men of national reputation and in many cases verified by testing laboratories. In many cases, rules or formulas were withheld until actual tests in laboratories had been made in order to prove the mathematics. The code has been adopted, or is in the process of adoption in New York, New Jersey, Pennsylvania, Ohio, Indiana, Michigan, Wisconsin, Minnesota, California, and other states.

Schooner of New Type Makes First Trip

By B. K. Price

THE CHARLES M. STRUYEN, first of a fleet of 4-mast schooners being constructed at a southern yard, recently completed her maiden voyage. This trip was watched with particular interest as the vessel was the first to be constructed from a new design, which had been brought out by Henry J. Gielow, senior member of Gielow & Orr, naval architects and vessel brokers, New York City, to meet the present tremendous demand for the speedy and economical production of bottoms.

The vessel, which is shown in the accompanying illustration, has a length over all of 190 feet, 6 inches, a beam of 37 feet, and minimum depth of hold of 13 feet. The keel is of white oak, 14x14 inches, with scarphs, 6 feet long, bolted together. White oak is used for the 12x20-inch stem, and 17-inch sided stern post. The forward deadwood extends up on the stem to meet the apron and runs down on the keel so as to make a good lap. This is bolted through the stem and keel while the aft deadwood, of white oak, extends

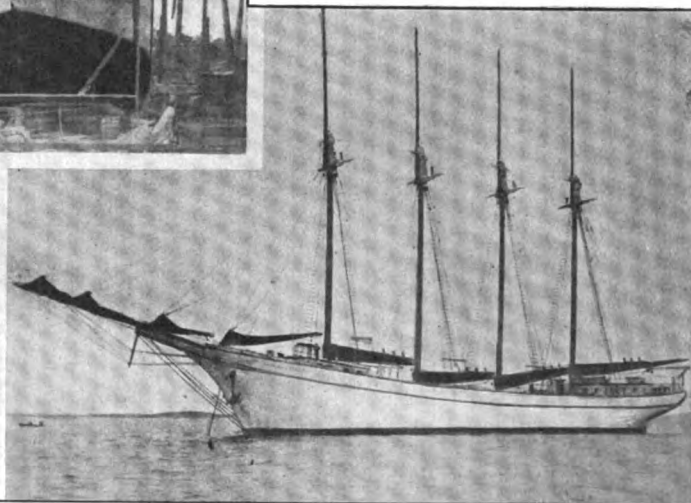
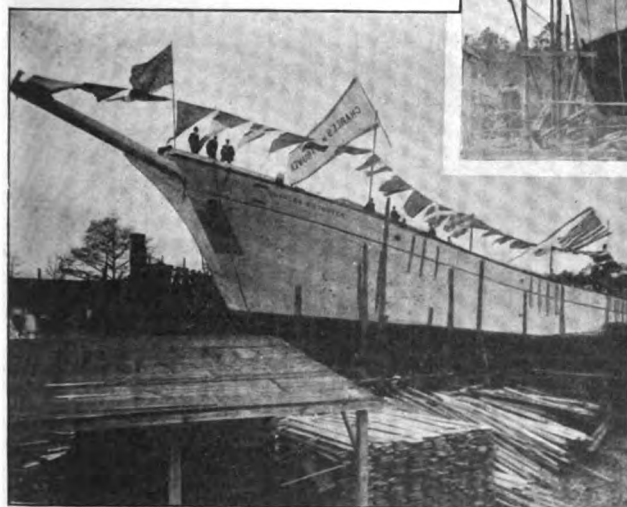
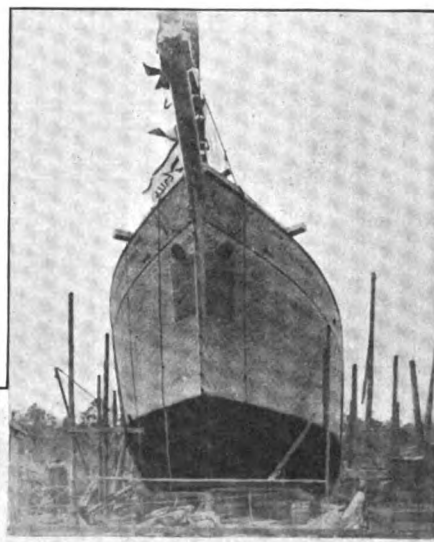
down on the rider keelsons, and is sided 14 inches. A heavy white oak transom sided 12 inches is bolted to the stern post. White oak frames are used throughout, being 14 inches at the heel and 12 inches at the planksheer.

Yellow pine keelsons, three tiers wide and three tiers high, are all scarphed with 6-foot scarphs and thoroughly bolted. Yellow pine, 10x14 inches, also is used for deck beams, except hatch beams and partner beams, which are 12x14 inches, molded 14 inches at centers and 8 inches at end, spaced 4 feet

from centers, and have hackmatack knees under each end of every beam thoroughly bolted. Three hatches about 14x18 feet, with yellow pine coaming 24 inches high and covers of cedar 1 $\frac{7}{8$ -inch dressed, tongued and grooved, are thoroughly ironed on top and inside, and are provided with two hatch bars at each hatch to set up with screw bolts. Stanchions are white oak. Garboards, planking and planksheer are yellow pine. Decking and stringers also are yellow pine while the deck beams are white oak. The masts are all selected Oregon pine. A hoisting engine, belted with drum for hoisting cargo, one 6-inch wrecking pump and one 3-inch suction pump are installed.

The vessel can carry 475,000 feet of lumber. On her maiden trip she loaded 930 tons of coal at Newport News for Martinique and made the trip in 20 days.

Under permit to construct for private account, the Liberty Shipbuilding Corp. of Delaware expects to build concrete cargo boats on Mobile bay.



NEW TYPE OF 4-MASTED SCHOONER WHICH HAS JUST COMPLETED HER MAIDEN VOYAGE

FIG. 1—ELEVATION AND TYPICAL CROSS SECTION OF SHIPWAY SHOWING ARRANGEMENT OF DERRICK TOWERS AND DERRICKS

Handling Materials at Hog Island

How Speed is Obtained at the Great Delaware River Plant
—Railroad Operations Important—Timber Derricks Used

By H. Cole Estep

AS NEARLY everyone knows, the Hog Island shipyard is not a shipbuilding plant in the old conventional sense of the term. Instead it is an enormous ship-assembling plant in which the products of hundreds of separate shops are brought together and worked into finished ocean-going vessels. Hog Island, therefore, represents a distinct departure in shipyard design and operation. A map of the yard, Fig. 2, looks much more like a drawing of a railroad terminal than of a shipbuilding plant. As a matter of fact, the success of the entire Hog Island program rests on the speed and precision with which materials are handled, classified and delivered to the particular shipways where they are needed. Essentially, the problem of the Hog Island yard is a problem in handling materials. As time goes on, this same statement can be applied with greater and greater force to all of the shipyards of the country. The speeding-up process so urgently recommended by Director General Schwab means that materials of all sorts must flow through the yards much more rapidly than ever before. The opportunity to study the meth-

ods worked out by eminent engineers for handling materials at the Hog Island yard, should not be overlooked.

To Get More Speed

IT IS only natural that in the construction of the greatest shipyard in the world at Hog Island near Philadelphia, a great many problems of general interest to shipbuilders should have been encountered and solved. To touch on all of these problems in a general article such as that published in the June issue of THE MARINE REVIEW is obviously impossible. Therefore, a number of supplementary articles, of which this is the first, dealing with the specific ship construction problems encountered at Hog Island, will be published in future issues. It is hoped that shipbuilders generally will be able to apply the experience gained at Hog Island to their own problems with the result that the great task of building ships and yet more ships to defeat the Hun, will be everywhere speeded up.

As the accompanying map indicates, the yard is laid out along the north bank of the Delaware river with its main axis running in a general easterly and westerly direction. The fifty shipways are arranged in five groups of ten each along the northeastern edge of the property. Each group of ways is 1013 feet in length and since there is a space of 142 feet between the groups, the total length of the shipways is 5775 feet or practically 1.1 miles. South of the shipways are the five fitting-out docks which extend along the waterfront for about three quarters of a mile. The railroad yards lie immediately behind the shipways and fitting out docks as shown clearly in Fig. 2.

The material enters at the southern end, passing finally to the holding yard at the north end of the property from which it is delivered to the proper shipways. Materials for the fitting-out docks go directly from the classification yard at the south end of the property to the proper dock.

Until the material actually reaches the shipways or fitting-out docks the operation of the Hog Island yard resolves itself into a railroad switching

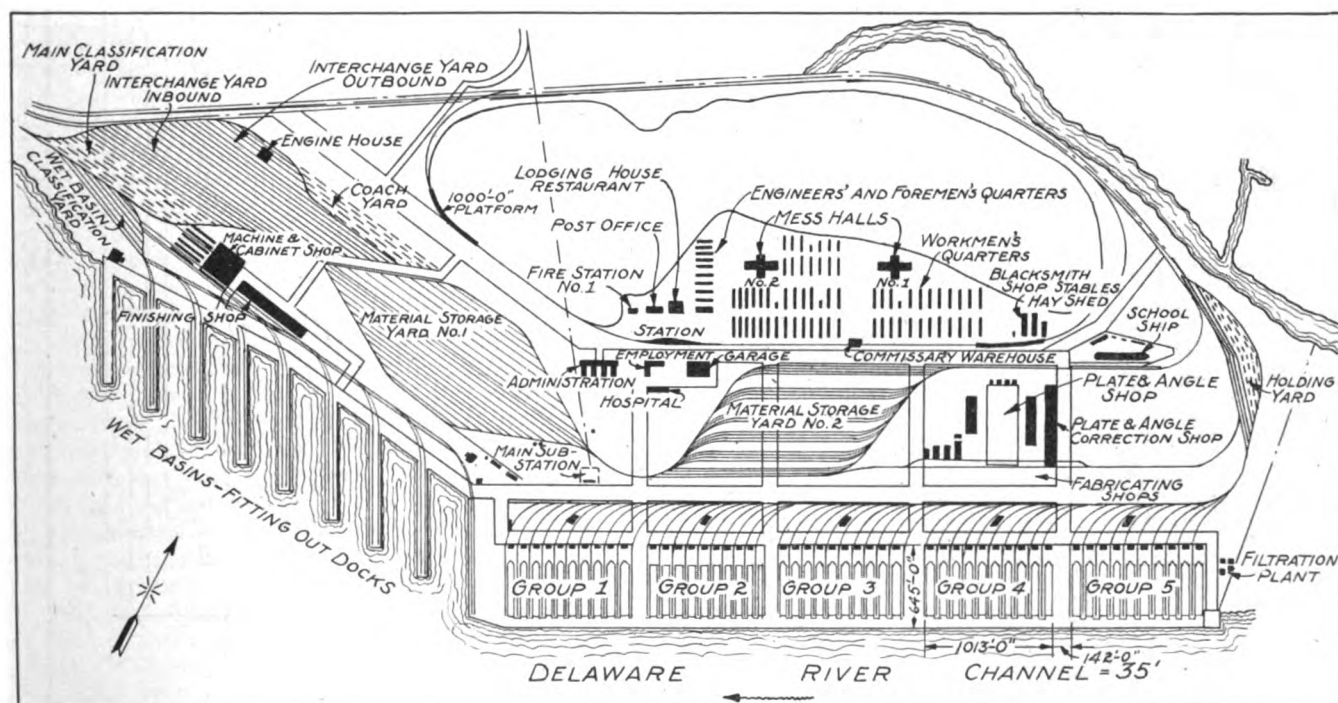


FIG. 2—MAP OF THE HOG ISLAND YARD SHOWING ARRANGEMENT OF THE SHIPWAYS, FITTING-OUT DOCKS AND FREIGHT HANDLING AND STORAGE YARDS

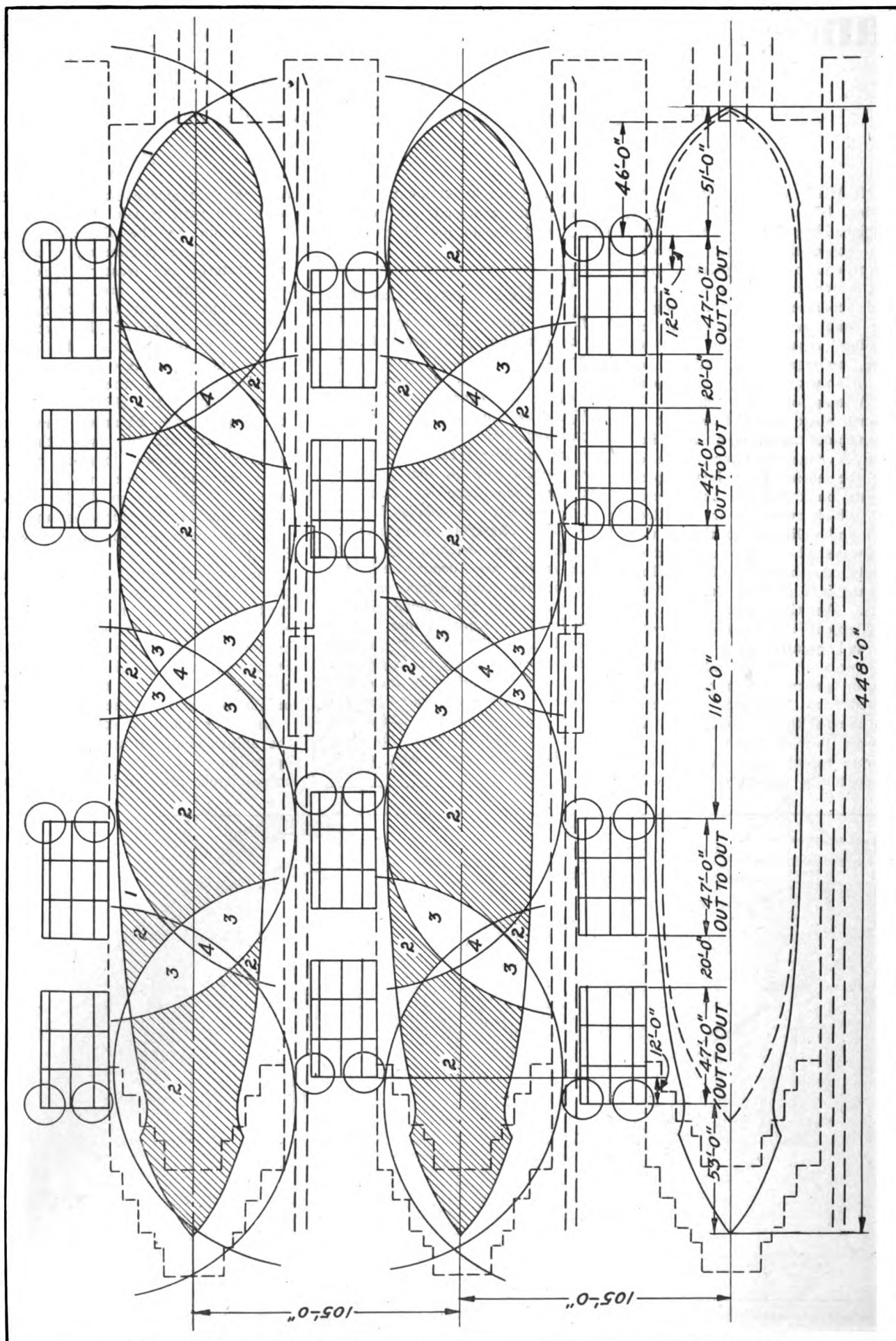


FIG. 3—PLAN OF WAYS SHOWING LOCATION AND NUMBER OF DERRICKS SERVING EACH PORTION OF SHIP UNDER CONSTRUCTION

problem. To describe this phase of the proposition by merely saying that 75 miles of standard-gage railroad track have been laid in the yard on which 14 locomotives, 50 box cars and 400 flat cars are operated is entirely inadequate. At Hog Island, railroading is second in importance only to actual ship construction. This phase of the work is in charge of E. C. Macey, general superintendent of transportation, an experienced railroad officer.

The trunk-line railroads deliver their carloads of fabricated steel, engines, boilers, pumps, condensers, etc., to the inbound interchange yard, clearly shown at the south end of the property in Fig. 2. Here the incoming trains are broken up and the cars regrouped according to the material with which they are loaded. They are then switched over to one of the two material storage yards. All material for the 7500-ton, 400-foot, 11½-knot steel cargo carriers is delivered to material storage yard No. 1. Material for the 8000-ton, 450-foot, 15-knot combined troop and cargo carriers, is delivered to storage yard No. 2. This avoids any confusion in the distribution of materials for the two standard types of vessels now being built at Hog Island. The original contract called only for 7500-ton boats and the original plans provided for only one material storage yard. When the new contract for fifty 8000-ton vessels was signed on Oct. 23, 1917, a complete rearrangement of the railroad switching facilities became necessary. This is only one of the factors which multiplied the difficulties with which the officials of the American International Shipbuilding Corp. were confronted during the worst weather last winter.

The materials are unloaded in the storage yards according to a carefully prearranged plan which insures all parts of the same kind being grouped in one place.

Locomotive cranes of the standard type, built by the Industrial Works, Bay City, Mich., the McMyler-Interstate Co., Bedford, O., and the Browning Co., Cleveland, are em-

ployed for unloading and loading cars in the material storage yard. About 40 of these cranes are on hand at present, and it is planned eventually to have 63 in operation throughout the plant. As the steel and other materials are unloaded, the cars are returned to the outbound interchange yard and made up into trains for the trunk-line railroads. In other words, the cars from the main line go no further than the material storage yards. From these points to the shipways all of the material is handled exclusively on equipment owned by the American International Shipbuilding Corp.

Every day the superintendent at each group of ways makes out a bill

into proper trains it is delivered where it is wanted when it is wanted. Therefore, there is no congestion at the ways nor should there be any delay due to nonreceipt of steel. In case operations at any particular point are held up by accident or other cause, the cars billed to that point can simply be held in the holding yard until they are needed, and the requisitions issued by the superintendents of the ways modified accordingly.

By referring to Fig. 2 it will be noted that a spur track extends out under the derricks between each set of ways. Every ship under construction, therefore, is served by tracks on both sides. Considerable material,

mostly from local points of production is handled by motor trucks. Seventy trucks are now employed and it is expected that eventually 150 will be needed. Over 15 miles of substantial roadway have been built throughout the yard for hauling with motor trucks. For handling the steel at the ways, wooden, stiff-leg, electrically operated derricks mounted on steel towers are employed. There are four derrick towers on each side of each slip with two derricks on

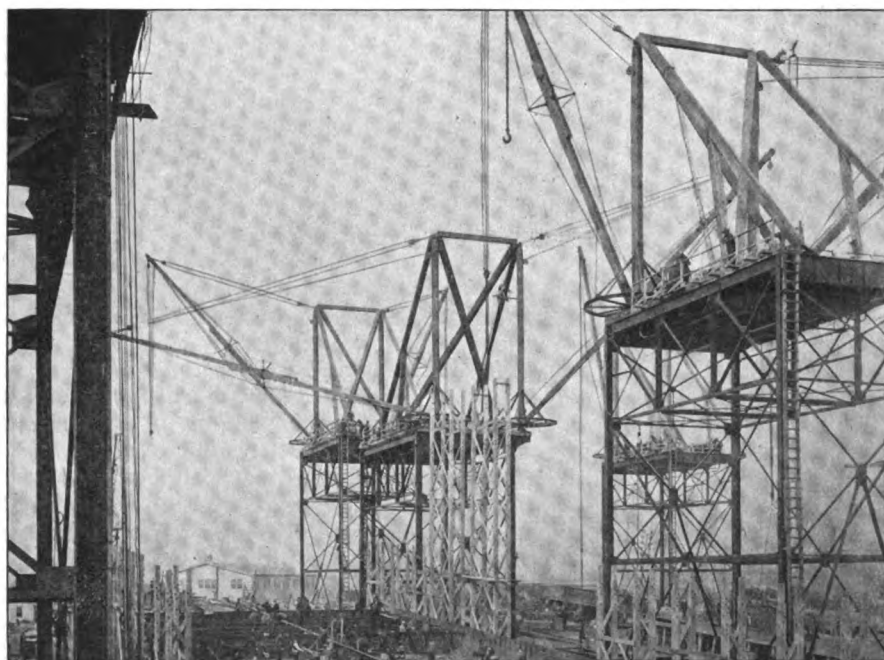


FIG. 4—EIGHT SWINGING DERRICKS SERVE EACH SHIP

of material for the steel, etc., he will need for the second day following. These requisitions go through the office of the superintendent of transportation and the designated material is loaded, usually onto flat cars. These cars are classified according to the group of ways to which they are consigned. The trains at the close of the day are then delivered to the holding yard at the north end of the property where they remain over night. In the morning switch engines pick them up and deliver the cars to the actual points where the steel is to be used. By this system each set of ways gets the material it needs for the day's work the first thing every morning and continuously throughout the day. The material has all been ordered beforehand in accordance with the needs of the situation and by means of the holding yard and the classification of cars

each tower. Each ship, therefore, is served by eight derricks. In addition a ninth derrick is situated on the ground at the head end of each way. The arrangement of the derrick towers and of the ways is shown in detail in Fig. 3. The ways for the 400-foot ships are 448 feet long, 68 feet wide, and are spaced on 105-foot centers. The slope of the keel blocks is 11-16-inch per foot. The ways for the 450-foot, 8000-ton ships are 541 feet long. The derrick towers are 47 x 26 feet. The inner columns for each pair of towers are set 20 feet apart. In the case of the 400-foot ships the distance between the after and the forward groups of derricks is 116 feet. In order to obviate interference by the derrick booms, and to compensate for the slope of the keel blocks, the derrick towers are of varying heights ranging from 53 to 66 feet. The

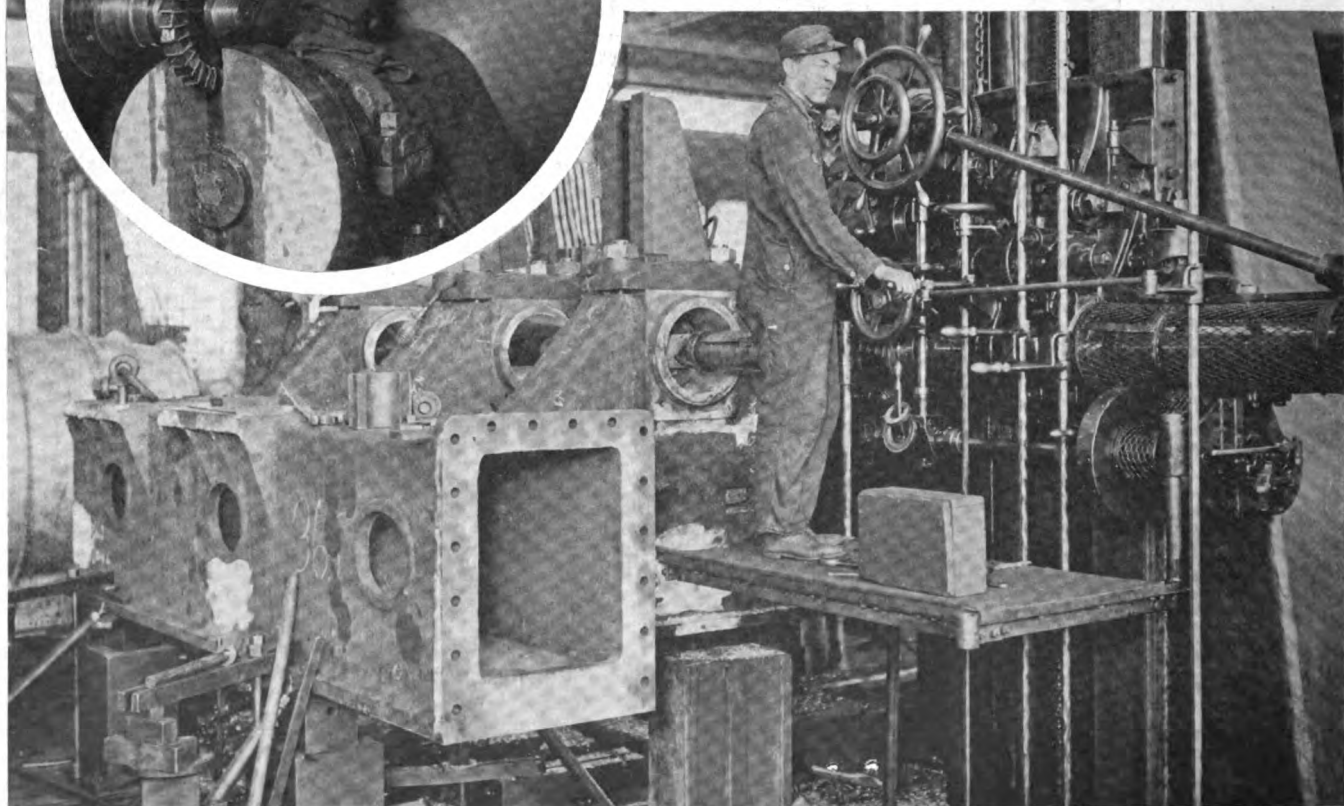
(Concluded on Page 313.)

Keeping Up With Launchings in the

The Diversity of Machine Work Required in Ship Construction

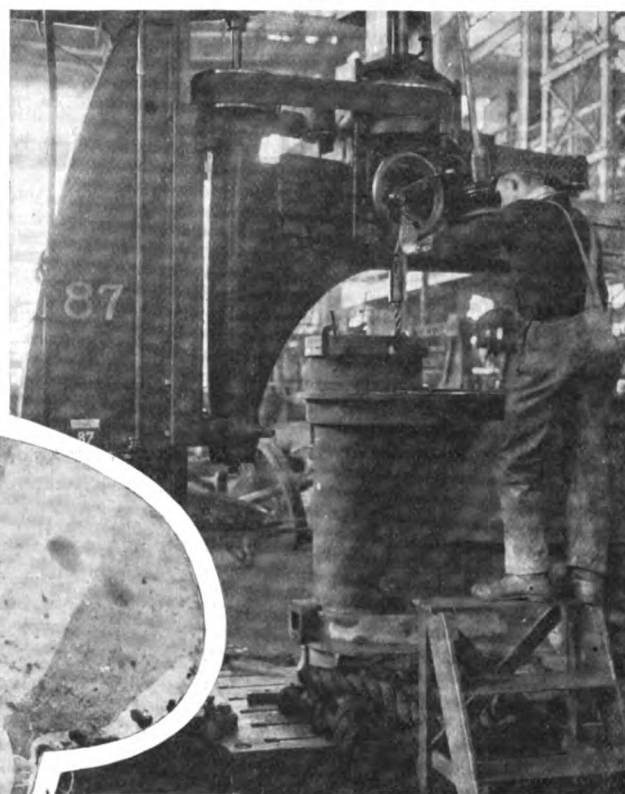
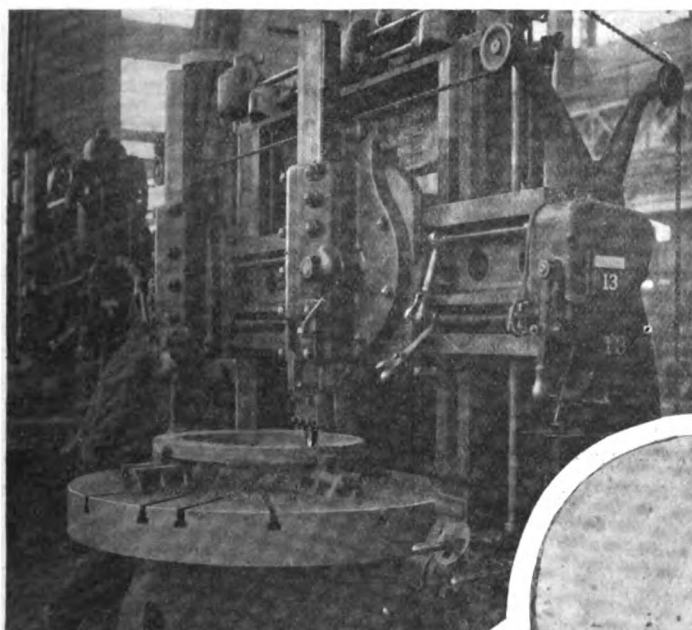


A ROUGH finishing lathe operation is shown above, while in the insert a miller is cutting a slot in the flange of a turbine rotor shaft. Below is a horizontal boring machine employed on heavy engine castings. In the center of the opposite page is a propeller mounted for planing the blades. The vertical boring mill shown at the top of that page is used for finishing the inside of cylinders. A great number

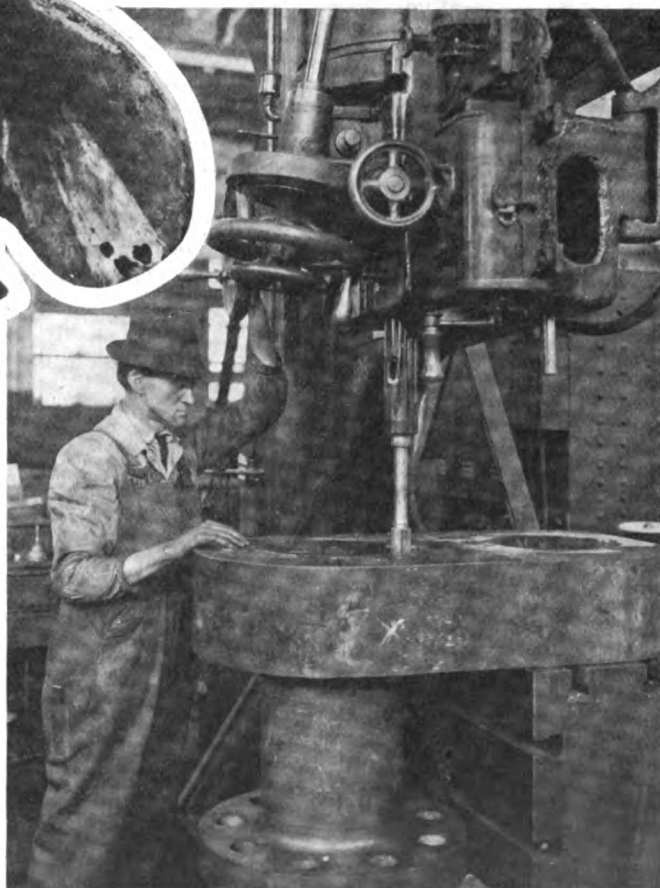
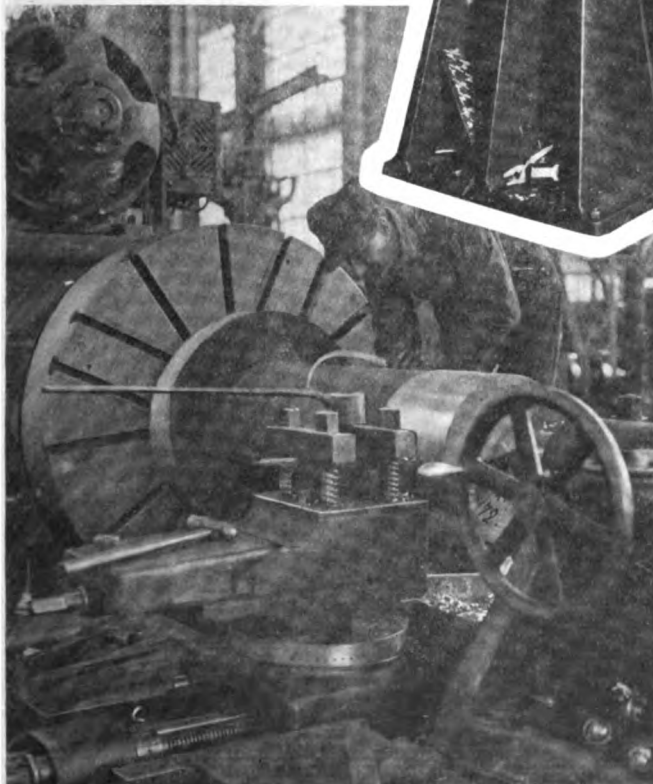
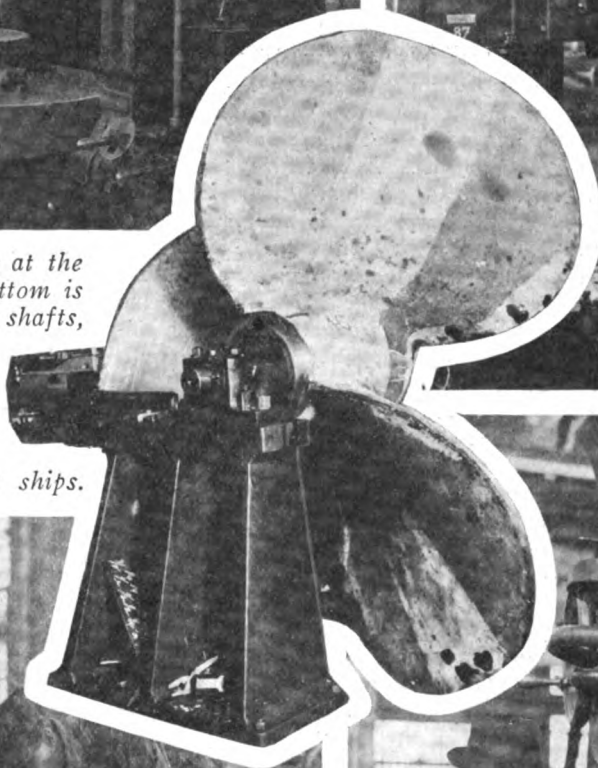


Machine Shops Throughout America

is Indicated by the Accompanying Shop Illustrations



of radial drills of the type at the right are used. At the bottom is lathe used in turning crank shafts, in which the keyways are afterward finished as shown at right. These illustrations indicate the variety of machine tools required in building ships.



More Steel, More Ships Are Assured

Director of Shipbuilding Program Tells Steel Manufacturers the
Part They Must Play in Furnishing Material for New Ships

By Charles M. Schwab

TONIGHT I face you with a heart so full of responsibilities and cares, and a heart so burdened with the thought that my friends in the iron and steel trade for so many years have placed a confidence in me that I must not disappoint; with a heart so full of emotion at the universal approbation and approval of what the President has seen fit to do, that I must, of necessity, speak tonight as the heart dictates and not in a tone of levity, but in a tone of peculiar responsibility of the situation which the United States and all of its people finds itself.

I am not vain enough to believe, nor is any man worthy of the name vain enough to believe, that any one individual can be a very great factor in any enterprise of such magnitude as the shipbuilding program. What is required is the united effort of everybody, and this undertaking is so vast and it is so important, that no man or no group of men can be successful without the encouragement, help and approval of every man, woman and child in this great United States of ours.

Work Had Been Well Done

I want to take this occasion, also, to say something more. Many people unacquainted with affairs at Washington are prone to criticize that which has been done. Personally, I don't mind saying that I felt as many others did, that matters in this direction had not gone well. I would not be fair to myself, nor

would I be fair to you or the people, if I did not take this occasion to say that in my opinion the work done in Washington by Mr. Hurley, Mr. Piez, General Goethals and the people who have been at this job has been magnificent. It has been difficult for people to appreciate, but let me tell you this story of ships.

Building a New Plant

When this war started every great yard in the United States capable of producing ships was taken up by the navy—practically all of the yards—and therefore the yards to produce ships for the Emergency Fleet had to be created. Now, you, as practical men, know what it means to create a new works, to organize that new works and to make it quickly efficient. I have already examined about 65 or 70 per cent of the ship-producing capacity in the United States, and I am obliged to say that the work has been magnificently and efficiently accomplished. Real credit must be given to the men who have done that work.

Do not let us enter into this job with a spirit of criticism; let us enter into it with a spirit of approval and encouragement and results are bound to come. I myself, since being engaged in this undertaking feel such a tumult of patriotism within my own breast, such a feeling of enthusiasm, such a desire to work and do something worth while, that if I can but only impart some part of the feeling in my own bosom to those associated with me in the yards, I

feel, gentlemen, that I will have accomplished my task and merited your approval.

Secondly, and more important: I am not a believer in the fact that we at Washington cut very much of a figure in this great undertaking. After all the men who will have the real responsibility of this great undertaking are the men in direct charge of the shipbuilding yards and the accessories for the ships. We in Washington can do little more than encourage the work and grease the wheels of progress; the real responsibility rests with those who have undertaken the work at their various plants and shops and yards. And there again the task and responsibility rest not alone with the management, but with the foremen, the superintendents, the sub-foremen, the head workman, yea, with the workmen themselves; and as a unit only, and by giving proper credit to all and proper encouragement, the result will be accomplished.

Program Will Be Carried Out

Now, gentlemen, don't think we are not accomplishing anything, because we are. Napoleon said: "Let me win my first battle and my campaign is won." We have started on this shipbuilding program during the past six weeks or two months with a wave of enthusiasm and confidence, and we have started at a pace that cannot be stopped, and with your approval, appreciation and encouragement, will go on to a successful issue. We can and will build the ships.

CHARLES M. SCHWAB, director general of the Emergency Fleet corporation and in active charge of the work of speeding up ship construction, delivered an address on May 31 under circumstances which few men are fortunate enough to have the opportunity to enjoy.

The occasion was the meeting of the American Iron and Steel institute. Judge E. H. Gary, chairman of the United States Steel Corp., and J. Leonard Replogle, steel director, had just spoken in terms of the highest appreciation of Mr. Schwab's work. "His appointment," said Mr. Replogle, "is an epoch of this war. It is a development which has tremendously pleased our allies. Mr. Schwab has the most dominant personality of any man I know."

In a lighter vein, Mr. Replogle pointed out that "I am especially pleased to voice my appreciation of him in view of the tribute he recently paid me. Mr. Schwab said, 'Replogle, is it true you are getting \$1

a year for your service to the government?' When I replied in the affirmative he said 'You are worth twice that much.'"

As Mr. Schwab rose to speak the 1200 leaders of the country's great steel industry gave him an ovation which revealed not only their appreciation of his work but their deep affection for the man himself.

Mr. Schwab spoke impromptu. He was visibly affected by the cordiality of his greeting. His address is the more valuable since he spoke with a full appreciation not only of the problems of the steel manufacturers in meeting the government's huge requirements but also from the fullness of his knowledge of the imperative necessity of advancing ship construction.

His address as presented herewith will be found of interest as expressing the thought of a man who is one of the country's largest shipbuilders, one of its greatest steel producers, and now one of its most important government officials.

During the month of May you will probably be pleased, and no doubt surprised when I tell you that the United States produced and placed in commission, ready for service—I don't mean launched—but I say placed in commission and in service—250,000 dead weight tons of ships.

I was over yesterday at the beautiful plant of the Submarine Boat Co., of which Mr. Carse is the president. They have done so nobly, taking that swamp last September and launching their first ship on Decoration Day. I was over to the plant, and when I saw that beautiful ship glide down the ways I said to the people: "How hard it is to realize that for every working day of this month of May two such beautiful ships as that were placed in the service of our United States government."

Now, I am sure that the month of May is going to be the least productive month we have had. I am not going to make any predictions. They are bad things to get out of if things go wrong. But you may be confident that with the same spirit prevailing, the country is bound to do better, and that this government and Lloyd George will, within a reasonable period of time, have that which they require. But what is necessary?

I have enlisted the support of every industry in the United States in the shipbuilding line, or in the accessory line, that is possible to enlist at this time for this work; but I felt that it was far from what was needed, for the amount of ships required by our army and navy was so stupendous, and I felt that we had to go still further than that. So during this past week we have authorized and contracted for new works, aggregating perhaps \$200,000,000 or \$250,-

000,000, that will increase the shipbuilding capacity of the United States at least 3,000,000 tons more per year. I do not hesitate to say that I should have increased it double that if I could have found the outlet or the ways and means of so doing.

The lake department alone, which has made a wonderful showing, predicts that they will produce this year between 400,000 and 500,000 tons of shipping on the Great Lakes alone. I told them it wasn't half enough, and I have their pledge that the proper extensions will be made, and that during the coming year we may expect out of the lake district alone at least a million dead weight tons of shipping.

Steel Supply Assured

I cite these figures, gentlemen, only to give you some idea of the stupendous program ahead of us.

In January we had 60,000 workers in the shipyards. Today we have 350,000 workmen and another 350,000 in the engine and boiler and accessory works of our ship work, making in all nearly three-quarters of a million men today engaged in the shipbuilding industry, to say nothing of the steel that goes into it or the kindred products.

Now I am taking the opportunity of saying that I am proud of the people in the steel industry. Some officials are nervous and fearful that we are not going to get enough steel. They may be right, but I am not worrying much about it. I know that the shipbuilding program is first on the list, and we will let the other fellow worry. I know we are going to get the steel. I know the steel

people are going to produce it. I may be optimistic but it is because I have a good deal of confidence in the fact that the steel manufacturers of the United States are going to give us this year and next year all the steel we require for the carrying out of this great program. And I know of no industry in any direction or anywhere that has so nobly, so patriotically, so willingly and so enthusiastically done its duty by the country as the iron and steel industry of the United States.

My whole heart and soul is in this one project. I want you with me and I want you to help me succeed; not for myself, but because you have given me your confidence. If I succeed, you succeed. If you succeed, the steel industry, the greatest industry in this country, succeeds. If we as a body of men representing that great industry succeed in this undertaking, we can well say as Horace said of old: "In the years to come it will delight us to have wrought these things." We will sit down in a world so full with liberty, democracy and good fellowship; a world so full with good fellows and good women, and talk over the things that we have so successfully accomplished. With a social democracy that shall bring happiness and prosperity to every man, woman and child in this great country of ours, we will feel rising within our soul that one thing than which there is no greater, a sense of patriotic satisfaction that we have done our duty; that we have done it not because we have been asked to do it, but we have done it with a heart full of love of our country; with a heart full of love of our fellow men.

One Method of Increasing Yard Efficiency

By Edward N. Hurley

SOME of the problems that you are meeting in this industry we have had to meet in the building of ships, and a brief outline of our efforts to overcome them may afford you some suggestions that will be of value in solving your own problems.

In the sphere of shipbuilding we built 91 new wood and steel yards since last July. Most of the organization that built these yards and many of those working on our great new merchant marine are men who had never before built ships. A vast force of men were put to work on yards and

ships of all kinds. New foremen and new superintendents were engaged. Many obstacles, such as develop in a new industry, turned up, but we constantly tried to improve our knowledge about the building of ships.

One particularly serious problem faced us. We found we did not have sufficient foremen or layout men. We started a number of schools to educate the men and teach the fundamentals of shipbuilding. Less than a year ago there were not 45,000 men employed in American shipyards—today we have 300,000 skilled mechanics and laborers in our shipyards, and 250,000 additional men are employed in making boilers, engines, winches, and other machinery.

We have a department of education and training, whose task it is to train workmen, foremen and superintendents. The training of the various kinds of shipbuilders in the yards is accomplished by putting the men to work on production jobs, under the supervision of a yard instructor. This yard instructor has full charge of gangs while they are learning. The jobs they do are selected for their educational sequence, but are all of them production jobs. The efficiency of a green gang under training will average about 80 per cent of a finished workman. Yard instructors are skilled mechanics to whom has been given a knowledge of teaching methods. This knowledge is gained in a training

Abstracted from an address by Edward N. Hurley, chairman, United States shipping board, before the National Coal association, Philadelphia, May 28.

center, which is designed to teach the skilled mechanics how to instruct. The mechanic is given an idea of instructional management, and how to get the instructions across effectively. The difference between a yard instructor so trained and a production foreman is that the former knows how to go about the job of teaching; whereas, the latter does not have that knowledge.

Training the Instructors

The first training center was established at Newport News, Va. To it were sent skilled mechanics, selected from the yards. They were given a six weeks course of training, eight hours a day. During the last part of this course they were obliged to spend 40 hours in the actual handling of gangs of green men. Yard instructors are drawn from a variety of trades, such as riveters, ship fitters, ship carpenters, caulkers, etc. While each one teaches a different line, the instructor training which they get is essentially the same.

Twenty-two plants have sent men for training as yard instructors. Two hundred and sixteen of these men have completed their training and 74 are now in training.

In addition to the training center established in Newport News, there are now several others established; namely, at Hog island, at Chester, Pa., at the Submarine Boat yard at Newark, N. J., and two special centers for the training of electrical welders at Schenectady, N. Y., in the General Electric Co., and at New York in the Quasi Arc-Weltrode Co.

The training departments in the yards which are responsible for the training of new men, are established as separate departments under the director of yard training. He has under his direction a staff of yard instructors. So far, 13 yards have put in training departments. One yard instructor can train about 150 men per year. The period of training for a green man varies from two to eight weeks. One yard has already trained enough yard instructors in the training centers to turn out weekly 300 skilled mechanics within the yard.

In addition to the training of green men, there exists the problem of taking men who are already skilled in allied trades, but have never worked in shipyards, and making them into shipbuilders. This is called a trade conversion course and consists essentially of determining what supplementary work a skilled mechanic from the allied trades must have in order to give him the necessary knowledge to do shipbuilding work. Careful studies of this conversion process and the instruction necessary have been made and special trade conversion instructors are employed in a number of plants to meet this situa-

tion. If we could do this in the shipbuilding industry, if we could develop in a year the building of wooden ships which has been a long lost art, if our workmen in many yards have increased in efficiency more than 25 per cent through this method in the past few months, it can be done in other industries. We did it by improving the management. Where we have efficient management we have efficient workers. You can't expect to have efficient workmen in an inefficiently managed shipyard nor can you expect good results.

Our shipyard workers generally are as fine a body of men as is engaged in any industry in this country. They are a patriotic, industrious group, and while in many yards they are not as efficient as we would like to have them they are learning daily and are increasing their output. When the history of our shipbuilding program is written, the American workmen, the men who really build the ships, will be the men deserving of any credit that may be due.

To Build Torpedo-Proof Ships at New Orleans

The Foundation Co., New York, will establish a shipyard on the new industrial canal, New Orleans, and will construct five steel cargo steamers for the French government, according to J. W. Billingsley, New Orleans representative. The vessels are to be virtually torpedo-proof, of a type never before built in the United States. Tests of an experimental boat of this type, Mr. Billingsley states, have led experts to believe that the weapon of the submarine will be practically wasted on these boats.

Each of the five will be of 4200-ton capacity, and the hull will consist of two parallel cylindrical hulls, joined throughout their lengths by a series of heavily-braced diaphragms. The space between these hulls not only will be divided into water-tight compartments by transverse bulkheads, but will form a completely sealed air chamber, running around the sides, ends and bottom of the hull, only the deck being free of this protection. The greatest damage a torpedo could do to this ship, according to the experts who have seen the working of the models, would be to puncture one of the bulkheads between the hulls, but the remaining air spaces would be sufficient to carry the ship along even though driven at top speed.

The vessels are to be powered with twin steam engines, either one of which will be able to bring the vessel into port, should the other be disabled. The ships will ride low in the water, offering poor visibility, and both will carry guns for defense.

Announcement is made at New Or-

leans that the first of the new ships will be launched early in 1919 and will start on her first voyage in April, 1919. This is the first notification that the Foundation company will establish a shipyard in New Orleans.

Concrete Tug Boats Now Being Built

The first concrete tug boats to be built in this country are now under construction at the newly purchased yard of the Fougner Concrete Shipbuilding Co., North Beach, L. I. The vessels, two in number, are being built for the Standard Oil Co. The company is also working on a concrete barge, 112 feet long and 30 feet wide, for the Standard Oil Co. The yard at North Beach was recently purchased from Ray Bros. and comprises about four acres. It has a frontage on Bowery bay, a cove in the East river, of 400 feet. Ten barges can be under construction at one time. As yet no government work has been started, but arrangements for the construction of concrete boats for the Emergency Fleet corporation are now being made. The company is controlled by the Fougner Brothers, Norwegians, who had a wide experience in the construction of concrete ships before coming to this country.

Orange, Tex., is making big gains as a shipbuilding center, and has nearly doubled in population and wealth during the past five or six years as a result of the establishment of shipyards there. Thirty-two wooden ships were on the ways there at the end of April, while more were being contracted for to take their places as soon as those now building are launched. There are five shipbuilding plants, with direct deep water to the Gulf of Mexico.

The big industrial canal at New Orleans will be ready to receive ships from launching ways along its banks in seven or eight months, according to announcement by W. B. Thompson, president of the board of commissioners of the port of New Orleans, which is in charge of the construction of the canal.

Plans have been completed recently by the Liberty Shipbuilding Corp., composed of eastern capitalists, to erect a large shipbuilding plant at Biloxi, Miss. The plant when completed will give employment to 4000 men.

The Aberdeen Shipbuilding Co., Aberdeen, Wash., is working night and day with a large force of men and more workers are being constantly added to the payroll. The company is at present constructing four federal vessels.

In the Traffic Manager's Office

A Review of the Month on Coasts and Lakes—Useful Pointers
for the Men Who Get the Business

German Nation Will Finance Trade War

THE pocketbook of the German nation is to be opened, after the war, for the benefit of the shipbuilder and shipowner. A comprehensive scheme of subsidies has been worked out, with maximum sums to be granted to those steamship lines which place new ships in service in the first few years after peace is signed. Some of the details of Germany's plans are given in the following excerpt from the *Journal of Commerce*, Liverpool, England:

Within the last two months the German government has announced its intentions so far as they refer to the subsidizing of German shipping. The subsidy is of a dual form, in that it subsidizes shipbuilding as well as the operation of the vessels, and is so graded as to stimulate the building of vessels within the shortest number of years following the conclusion of peace.

Replacing Lost Ships

To go back a bit, however, we might refer to the now famous interview of Herr Ballin, of the Hamburg-American Line, with a representative of the *Copenhagen Press* in June, 1916. Mr. Ballin then indicated the number of ships which had been completed or ordered to replace the vessels of the German merchant marine which had been sunk or captured at sea, or seized as a result of war by the allies. It is a curious fact that Mr. Heineken, of the North German Lloyd, reiterated recently much the same statements, further indicating the names of some of the vessels which were nearing completion. Some of these, it may be remarked, were in the stocks as far back as December, 1913.

The following table shows the number of German merchant ships which were under construction at the various German shipbuilding yards on Dec. 31, 1913:

Company:	Vessels	Tonnage
Blohm & Voss, Hamburg.....	3	128,000
Weser Co., Bremen.....	14	110,500
Bremen Vulkan Co., Vegesack. 12	110,000	
Tecklenberg Co., Geestemunde. 12	93,400	
Flensburg Co., Flensburg.....	14	88,560
Schichau Co., Dantzig.....	2	70,400
Howaldtswerke Co., Kiel.....	5	38,080
Neptun Co., Rostock.....	6	27,000
Vulkan Co., Stettin.....	1	19,300

Vulkan Co., Hamburg.....	1	18,000
Kook Co., Lübeck.....	8	15,810
Seebeck Co., Geestemunde....	5	15,545
Rickmers Reismühlen Co., Bremen.....	3	15,480
Reiherstieg Co., Hamburg.....	2	15,600
Stettin Oderwerke Co., Stettin	8	11,745
Frerichs & Co., Finswarden...	2	11,100
F. Krupp & Co., Kiel.....	1	9,600
Luxemburg Co., Emden.....	2	7,450
Nuscke & Co., Stettin.....	3	3,950
Totals	104	810,520

These include 21 large vessels, totaling 385,000 gross tons, or nearly one-half of the total being built in German yards, on behalf of the Hamburg-American Line and the North German Lloyd, for their passenger and emigrant traffic between North and South America. Seven ships of from 18 to 24 knots speed, namely, the BISMARCK, TIRPITZ, VATERLAND, ZEPPELIN, BURCHARD, HINDENBURG, and COLUMBUS, aggregating 236,200 tons, were among them, yet the utterance of the heads of these two companies are so discreetly veiled as to leave us in doubt as to whether all of these have been completed or not. If they have been completed, the news would have been shouted from the housetops, so that we might console ourselves with the belief that they are still waiting the advent of peace before the final touches can be put to them to make them ready for their intended services.

Ships for World Trade

In addition to the vessels named, the CAP TRAFALGAR, which was in 1914 sunk by the Cunarder CARMANIA in a stand-up fight off the coast of America, after the outbreak of hostilities, and its sister ship, the CAP POLONIA, which was launched in March, 1914, were under construction at the date under review, as well as three vessels aggregating 19,400 tons for the German East Africa Line. The figures also include 83 cargo vessels totaling 425,000 gross tons, of which six of them, amounting to 40,000 tons, were intended by the North German Lloyd to be put into their trade with Australia, and seven others, amounting to 56,000, to be put into the trade with the Far East. Of the vessels indicated the only two of any great importance which were completed before the outbreak of the war were the VATERLAND, which was seized by the United

States on her declaration of war, and which was quickly repaired and put in service on behalf of the allies and the CAP TRAFALGAR.

At the outbreak of the war certain German steamship companies were, by a special decree, permitted to withhold their annual balance sheet. Obviously this was to conceal from the shareholders the ruinous state of finance to which the steamship companies must be reduced by the inactivity of the vessels which are left to them, or by the loss which they have suffered in tonnage.

Need Government's Help

If German shipping is to be anything in the future, it was necessary that substantial amounts should be provided by the government. The government prohibited the sale of German steamships to foreign owners; not so the Austrian government, which very neatly scored over its German confederate by disposing at a very high figure of certain of its vessels to the United States government last year. The chagrin of German steamship companies, which had been refused such authority by their government, later to find their vessels seized on the outbreak of the war by the United States, can be better imagined than described, and the German government now hasten forward with a scheme for subsidizing her shipping. A committee which was formed to consider the question recommended the expenditure of \$75,000,000, but this was deemed by the shipping community to be totally insufficient to be of any practical use, with the result that the government's proposals were modified.

Instead of paying a fixed sum, a bonus on a sliding scale is being provided. The subsidy to shipowners for the replacement of their tonnage is fixed on the basis of the peace value of the ships which they desire to replace, but, owing to the rise in the price of materials and wages in construction, additional sums may be granted, varying in accordance with the date on which the new ships are to be put into service. If the vessel is put into service within three years after the completion of peace, the addition may amount to as

much as 60 to 80 per cent; it might amount to 40 to 60 per cent if the ship is put into service between the third and sixth year, or it might amount to 20 to 40 per cent if the vessel goes into service between the seventh and ninth year.

The decision of the government may have been foreseen by the German shipbuilding companies, who have recently embarked upon a policy of extending their yards. At Lubeck, Kiel, Rostock and Stettin they have increased their capital by 7,000,000 marks, in preparation for the shipbuilding activity which they felt was sure to come. It is not possible to gather from the data supplied from German sources what amount of subsidy is likely to be provided or what amount of tonnage is likely to be built with the subsidy, but \$250,000,000 has been hinted at as the total amount.

There is this to be borne in mind, that the government is taking steps to commandeer all German tonnage for the purposes of the state. Vessels to be constructed or repaired by the help of such subsidies must not be sold to any foreign nation during a period of 10 years after the vessel has been put into commission. The carriage of cargo by the vessels is to be limited in the first place to the transport of raw materials to Germany, and to the export of manufactured articles to help to re-establish German credit abroad.

Government Controls Charters

No contracts for charter or for the carriage of freights are to be made with any alien during the period of 10 years without the previous assent of the government authorities. At the same time, the government has put a stop to and cancelled all contracts for the carriage of goods by German ships which had been effected since Dec 1, 1916. It will be recalled that German shipowners endeavored to tie exporters and importers to German shipping, by the formation of long-date contracts, at high war rates of freight, which it was hoped would bring in a very considerable revenue at a time when, with more merchant tonnage available on the world's trade routes, there would be a considerable drop in freights.

Germany at the outbreak of the war had, in round figures, 5,000,000 tons of merchant shipping. What she will have when she is again permitted to trade on the seas is a matter for speculation. Today she has at her disposal the round figure of 2,000,000 tons, and this, if she is not permitted to enter into the routes and services she held before the war, will be more than sufficient for her needs. If Germany devotes the whole of her shipbuilding resources to the building of merchant tonnage, backed up by heavy government subsidies, she will

not be long in making good the losses in point of tonnage. Tribute must be paid to the German ability to organize, and the preparations and amalgamations that are being completed, among her shipping, her shipbuilding, her banking and her industrial concerns, reveal the intention to embark on a huge policy of commercial aggrandizement as soon as peace is signed.

Reports Activities at Port of Philadelphia

In the 1917 report of the department of wharves, docks and ferries, Philadelphia, George S. Webster, director, details the activities of maintaining the second largest port in the United States. He points out that the entrance of the United States into the European war has interfered seriously with the regulation methods of shipping. The government, owing to its need for additional port facilities, will take over the pier at the foot of McKean street, Delaware river, as soon as it is completed.

The advantages of Philadelphia as a shipbuilding port, the report states, are manifest and "the aggregate tonnage leaving the ways of the six largest companies located on the Delaware river, during 1917, was 307,604, representing a value of approximately \$76,000,000. In the near future there will be 146 shipyards in this district and it is estimated that 36 per cent of the ships now building in the United States are being constructed in Delaware river yards."

Vessels to the number of 1347, with a tonnage of 4,833,536, arrived from foreign ports during the year while 2913 vessels with a tonnage of 3,904,336 arrived from coastwise ports.

Among the improvements being made, the principal contracts in force are for building the Cherry street pier, which is a single-deck structure 535 feet long and 100 feet wide, with a steel and concrete superstructure, and the McKean street pier which is the first of the projected group of four large piers called the Moyamensing group. This pier is 900 feet long and 250 feet wide.

Plan New Boston Pier

A large pier on the East Boston waterfront is about to be constructed by the Massachusetts waterways commission, on property purchased by the state. This pier will be capable of accommodating steamships of largest type and will be equipped with facilities for expeditious handling of cargoes. The project is planned to meet the increasing need for facilities for com-

mercial interests of the port. Engineers of the waterways commission have been instructed to rush the preparation of plans for the new pier which is likely to be used largely for ocean freight from South America and South Africa which includes raw products for New England manufacturers, especially wool and hides.

Value of Lake Trade

During the year 1917 the value of the merchandise passing through the Soo canals amounted to \$1,196,922,183. This is the highest record ever reached and it shows a gain of \$221,761,017 over the value of freight carried through the canals in 1916. Last year 33,061 vessels passed through the Detroit river. The registered tonnage of these vessels was 69,297,723. The value of merchandise passing through the Detroit river in 1917 was \$1,269,590,776. At Duluth during the year 1917, \$72,801,381 represented the value of freight received, while the value of shipments for the same year amounted to \$179,496,120. At Superior, Wis., the value of goods received was \$69,111,145, of goods shipped, \$149,901,090.

Improve Hell Gate Channel

Frying Pan shoal and Pot rock, the two greatest menaces to navigation in the narrow channel through Hell Gate, New York harbor, are to be removed as a result of a contract let by the war department to the New Jersey Shipbuilding & Dredging Co., Bayonne, N. J. The company will begin drilling immediately and it is expected that about two years will be required before the work is finished. The shoal and rock are to be removed to a depth of 35 feet. The New Jersey Shipbuilding & Dredging Co., which is the successor of the R. G. Packard Co., has issued a map which will enable navigators to avoid the area in which the work of removal is to be done.

The China Mail Steamship Co. has been reincorporated at San Francisco to do a general shipping and transportation business with a capital stock of \$10,000,000. Subscribers and directors are John Barneson, Charles R. Blyth, H. U. Brandenstein, all of San Francisco; Look Tin Eli, M. Q. Fong, both of Oakland, Cal.

The first of a fleet of 200 government lighters for operation in New York harbor was recently launched at the yard of the Inland Waterways Co., Baldwinville, N. Y., 11 days ahead of schedule. Nine more of these lighters will be launched shortly.

Moisture Effects on Fir and Pine

Air Dried Timber Reabsorbs Moisture Rapidly—Strength is Reduced as Moisture Content Increases—Fir and Pine Compared

By Irving H. Cowdrey

THE effect of moisture on the properties of timber has become a well-established and recognized fact. Every practical man, whether he be an engineer or a shipbuilder, knows full well that the removal of moisture

tion. Many men, and practical men at that, do not realize that seasoning is only a part of the story. There is often expressed great surprise at the rapid and very appreciable regain of moisture by wood after it is removed from the

for several years in the laboratories of the Massachusetts Institute of Technology. During the summer months these beams always manifested a very noticeable stiffening and consequent decrease in deflection at the center, even

New Lumber Facts of Importance to Shipbuilders

UNDER ordinary atmospheric conditions air-dried timber quickly reabsorbs moisture and undergoes certain changes in its characteristic properties. In order to determine how much greater would be the response and the consequent change in properties if the timber were introduced into a saturated atmosphere at a reasonably high temperature or if completely submerged in water, a series of investigations was conducted during the past year at the Massachusetts Institute of Technology on two important structural timbers—Douglas fir and southern hard pine. These tests are described in detail in this paper and the results obtained presented in the form of graphs. The unusual value of this information to wooden shipbuilders is self evident. While these tests were made on a limited number of small specimens and the results are confessedly comparative and qualitative rather than quantitative, the author is nevertheless of the opinion that an analysis of the data given will justify the following statements:

In the air-dry condition with approximately equal moisture contents the compressive strength of hard

pine is about 25 per cent greater than that of Douglas fir.

When exposed to air saturated with water vapor at 120 degrees Fahr., and when immersed in fresh water at 70 degrees Fahr., the moisture reabsorption of air-dried fir is greater and more rapid than that of pine.

The temperature effect on strength decrease is of more importance on pine than on fir.

Pine shows a more rapid decrease in strength with the moisture increase than does fir. The more rapid reabsorption by fir tends to offset this effect when the time element is used as a basis, so that for a given time of treatment the pine remains the stronger although the strengths tend to approach each other with more extended treatment.

For moisture contents above 11 per cent when due to reabsorption from air saturated at 120 degrees Fahr., the fir is stronger in compression than the pine. The same relation appears for moisture contents greater than 20 per cent when due to soaking in fresh water at 70 degrees Fahr.

from timber, or the so-called seasoning, produces marked changes in its strength, hardness, stiffness, resiliency and other characteristic properties. Much has been done in the way of scientific investigation by the bureau of forestry, the forest products laboratory and various universities and technical schools to determine the effect of the progressive removal of moisture on the strength of timber of all kinds.

The results obtained have appeared with lengthy discussions in the bulletins and technical papers issued by these bodies and in the proceedings of various professional societies. In view of this, it were a waste of time and effort to present such data and such discussion in this paper.

To the reversal of this process there has been given considerably less atten-

tion. This reabsorption, moreover, is not confined to kiln-dried wood, but occurs as well in the case of timber which has been thoroughly air-dried. In fact, the reabsorptive power of air-

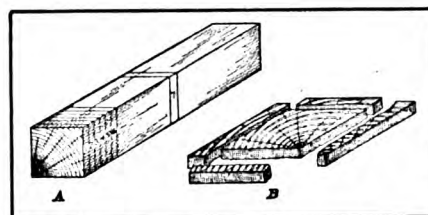


FIG. 1—METHOD OF CUTTING SPECIMENS

dried timber is believed to be somewhat greater than is that of timber which has been properly and thoroughly kiln-dried. The effect of atmospheric conditions on the physical properties of timber through their effect on the moisture content of the wood is well exemplified by the behavior of certain beams which were subjected to a time test under load

though subjected to load far in excess of the proper working load for such beams. While of course no moisture determinations were possible under the conditions noted above, yet the common fund of engineering knowledge would point to the moisture factor as the proper explanation of this observed behavior.

If, then, wood responds so quickly in its reabsorption of moisture under very ordinary atmospheric conditions, and in consequence thereof undergoes change of properties, how much greater will be the response and the consequent change of properties if the timber be introduced into a saturated atmosphere at reasonably high temperatures, or if it be completely submerged in water?

A recognition of the importance of these items and the belief that reabsorption is a factor to be reckoned with has led to a series of investigations during the past year in the testing materials laboratory of the Massachusetts

A paper presented at the spring meeting of the American Society of Mechanical Engineers, Worcester, Mass., June 4-7. The author, Irving H. Cowdrey, is connected with the department of mechanical engineering, Massachusetts Institute of Technology, Boston.

Institute of Technology to determine the quantitative effect, if possible, of such conditions. While Douglas fir (*Pseudotsuga Douglasii*) has been known and used for a little over 50 years in shipyards, usually in the east under the name of Oregon pine, it is only with

in selection. In the form of 4-inch planks it remained in the testing laboratories about six months under the conditions of heat and moisture ordinarily pertaining to such localities, being open to free and complete circulation of air over and around the material.

Tests showed the moisture content to be between 6 and 8 per cent for all pieces. The timber, then, may be considered to have been thoroughly air-dried. From these planks were cut specimens which were planed to a section 2x2x20-inch. These pieces were cut further into blocks 8 inches long, and the pairs thus obtained were used in most cases under similar conditions of treatment for check purposes. All treatments were conducted on specimens 8 inches long and tests were made on specimens 6 inches long formed by the removal of 1-inch from each end of the treated specimen.

A number of specimens of both pine and fir were tested in the air-dry condition to establish their initial properties. One set consisting of 20 pieces of pine and 20 pieces of fir was subjected for various lengths of time to a saturated atmosphere at 120 degrees Fahr. Another similar set was immersed in fresh water at 70 degrees Fahr. for various periods of time. The relative rates of moisture penetration and the properties of the wood as determined by direct compression in a direction parallel with the grain were investigated and the results appear later in this discussion.

The moisture determinations were made as follows: From the blocks were cut sections approximately 1/4-inch thick. Six of these were cut from the first 1 1/2 inches of length and a seventh from the center. See A, Fig. 1. It was necessary to eliminate the effect of lateral penetration of moisture, consequently the outer 1/4-inch was removed from these sections with a chisel, as indicated at B, Fig. 1. The relatively slow lateral penetration as shown by various tests made by the bureau of forestry would indicate that this was sufficient precaution. In order to eliminate or at least minimize the effect of evaporation from the end grain, the sections were cut with the greatest expedition possible with a hand saw in a miter box and then immediately placed between clean glass plates. The edges were trimmed and the initial weighings made with the least possible delay.

The moisture content was obtained in the usual manner. After removal of all adhering dust and splinters, the sections were carefully weighed. They were then exposed to a reasonably dry air bath at 212 degrees Fahr. This temperature is necessary to effect the complete removal of the moisture. Care must be taken that the temperature does not exceed this value, because of the possibility of a loss in weight due to the

evaporation of some of the more volatile oils. It is probably true that some slight distillation may occur even at 212 degrees, but it is likewise probable that some slight moisture remains, even when the sample has been dried to a constant weight at this temperature. The known facts seem to justify the assumption that one of these effects very largely counterbalances the other, or at least that any existing discrepancy is of a magnitude negligible in this discussion.

Oven-Dry Weight

The drying is continued until a constant weight is obtained. With samples of this size and form, taken from the woods under consideration, this constant weight is generally obtained in about 1 1/2 hours. This is known as the oven-dry weight.

The loss in weight under the foregoing conditions, divided by the oven-dry weight, expressed as per cent, gives the moisture content.

While the moisture even in so thin a block as those investigated will doubtless vary from surface to surface, yet it seems sufficiently accurate for the purposes of this paper to take the average value as representative of the conditions at the center of the section. These values have been so assumed and

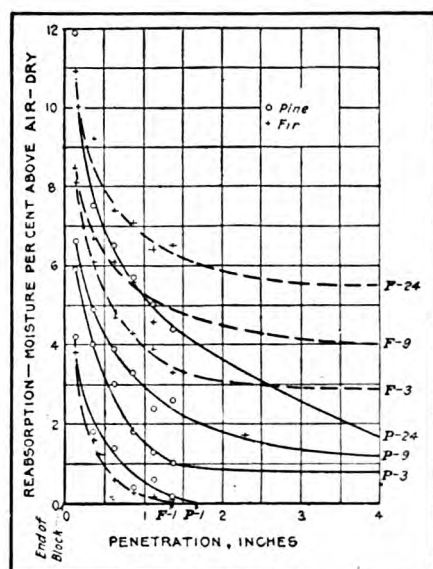


FIG. 2—REABSORPTION OF SPECIMENS WHEN EXPOSED TO SATURATED AIR AT 120 DEGREES FAHR.

P-1 indicates pine treated 1 hour; F-9 fir treated 9 hours; other symbols to be similarly interpreted

the recently increased transportation facilities that it has appeared in such quantities as to necessitate that it be reckoned with in the East as a structural timber.

This fact led the experimenters to make a parallel investigation for the purpose of comparing this Douglas fir with southern hard pine. In so far as the writer is aware, this is the first work of the kind to have been done on Douglas fir. The pine used falls under the classification of "dense southern pine" according to the standards of the American Society for Testing Materials and is very probably the long-leaf yellow pine (*Pinus palustris*).

Nature of the Investigation

The tests were carried out, it is true, upon small specimens and in consequence are open to criticism such as has been made concerning much of the work which has been done by the bureau of forestry. It must be acknowledged that the results are scarcely to be used as constants of design, but it is believed that they may well be used as indicative of certain truths and as a means of comparison in the guidance of the users of the two timbers placed under observation.

The investigation under discussion may be briefly outlined as follows: The stock used had been purchased in the open market without any special care

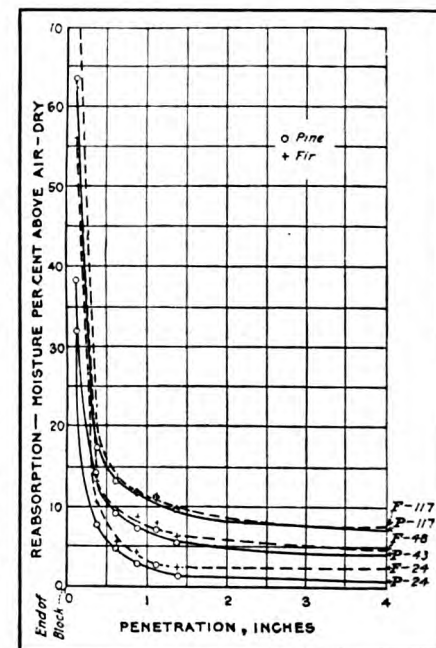


FIG. 3—REABSORPTION OF SPECIMENS WHEN COMPLETELY IMMERSED IN FRESH WATER AT 70 DEGREES FAHR.

P-24 indicates pine treated 24 hours; F-48, fir treated 48 hours; other symbols to be similarly interpreted

are plotted in the curves of Figs. 2 and 3.

In any discussion dealing with the effect of moisture on the characteristics of wood it is very essential to have in

mind the form in which water may exist in the cellular structure. This may be found discussed at length in many of the existing publications dealing with the subject, yet it seems pertinent and desirable to briefly outline the matter at this time.

The water present in wood may exist as free water within the cellular spaces, the canals and ducts, and possibly to some slight extent in the intercellular cavities; and as water which has been actually absorbed by the material which constitutes the cell walls. It is commonly supposed that the absorption of water from moist air at least is first an absorption by the cell walls, and that later under some conditions there occurs a partial filling of the cell cavities. The maximum water content possible without the presence of free water in the cells and canals is known as the fiber-saturation point. When water is absorbed because of the actual immersion of the wood it is very likely that free water may exist in the cells without the cell walls having absorbed a quantity sufficient to produce fiber saturation. For most of the more common timbers this fiber-saturation point occurs at a moisture content of approximately 25 per cent. Most writers consider that it is only this second form, or "imbibed" water, as it is sometimes called, which affects the strength. No satisfactory theories have been advanced to elucidate the phenomenon. Whether the action is purely physical or whether it may partake of a certain chemical semblance is a point of some disagreement. It would seem to the writer as though perhaps there may occur some of the effects of colloidal solution. This last suggestion might to some extent be borne out by the fact that a very complete kiln-drying at high temperature prevents or markedly decreases certain effects commonly produced by reabsorption of moisture such as swelling, increase of pliability, etc.

Again, the writer would hold that the free water in the cells and canals may also have a weakening effect, due to resolution of some of the salts which are undoubtedly deposited within the cells as the sap dries out, or in the

case of heart wood by infiltration during the life of the tree. These crystalline deposits, it would seem, must have a stiffening effect, and, if present in sufficient quantity to fill completely the cell or to bridge it at any point, should add quite materially to the rigidity of the cell, as latticing adds to the rigidity of structural compression members.

Only the rate of penetration in the direction of the fiber was investigated. The specimens, in the form of blocks 2x2x8 inches were subjected to the desired treatment for periods ranging from one hour to 117 hours. At the end of the period of treatment the moisture content was obtained as previously described.

While the relative behaviors of the pine and fir show certain points of similarity with regard to their reabsorp-

curves take a hyperbolic form and it will be noted that in every case except that for the one-hour treatment the reabsorption by the fir is much in excess of that by the pine. It has seemed best to plot the reabsorption in terms of the moisture content in excess of that present in the air-dried condition rather than the absolute moisture content. This was done to eliminate if possible any variation of hygroscopic action inherent in the specimen due to structural peculiarities.

Referring to curves P-1 and F-1 representing the conditions at the end of an hour's treatment, it will be noticed that no reabsorption was manifest beyond a point approximately 1½ inches from the end. The curves F-3 and P-3, showing the effect of three hours' treatment, clearly indicate some

absorption, even at a distance of 4 inches from the exposed end grain. This furnishes a very striking example of the extreme rapidity with which moisture will penetrate along the grain of timber when it is exposed to the action of hot, moist air. It should be noted that in none of the treatments did the reabsorption become greater than 12 per cent average moisture in the first ¼-inch from the end. With the

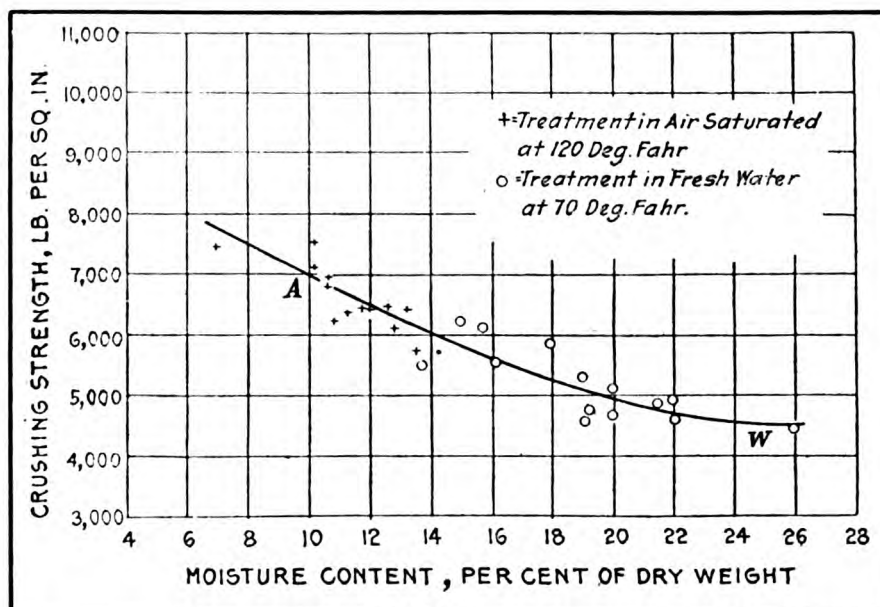


FIG. 4—RELATION BETWEEN MOISTURE CONTENT AND CRUSHING STRENGTH OF DOUGLAS FIR

tion from both saturated air and from water, yet certain details are sufficiently variant to warrant a separate discussion.

When studying the effects of reabsorption when exposed to saturated air at 120 degrees Fahr., the specimens were treated by placing them on a grid just above the surface of hot water in a covered steamer freely vented to the air. A constant-level reservoir was attached to supply water as was made necessary by evaporation. Heat was furnished by a gas burner beneath the steamer and the entire device was placed in a glass-fronted closet in a room of reasonably uniform temperature. It was thus found possible to maintain the temperature of the vapor in the steamer within the limits of 2 degrees Fahr. variation during the longest period of treatment, namely, 24 hours.

Fig. 2 shows the reabsorption of the specimens during periods of one, three, nine, and 24 hours of treatment. The

air-dry condition of 8 per cent of moisture or less, giving a total moisture of 20 per cent or less, it would seem that the fiber-saturation point was not attained. However, the point plotted represents the average only for the first ¼-inch, and as the plots show, the moisture content decreases very rapidly at first; hence it seems fair to presume that the walls of the cells immediately adjacent to the surface may have reached the point of saturation. From this it might be inferred that saturated air at 120 degrees Fahr. is capable of producing fiber saturation. At the same time it seems reasonable to suppose that if the treatment were continued for a period of sufficient length this condition might extend throughout the timber regardless of size. The logical conclusion to be drawn from this leads to the statement that timbers subjected to the action of saturated air

at 120 degrees Fahr. must be designed on a basis of constants determined from tests on green timber.

For studying reabsorption when completely immersed in fresh water at 70 degrees Fahr. the specimens were treated by immersion in a tank of water in which continuous renewal was maintained at such a rate that an entire change was effected at least once each 24 hours. Temperature regulation was arranged to keep the water at 70 degrees.

Reabsorption tests were made at the end of 1, 24, 48, 72 and 117 hours. The observations were all concordant and hence only the data obtained from the 24-, 48- and 117-hour periods have been plotted in Fig. 3. Here the relative reabsorptive powers of pine and fir are much more nearly alike than in the case of the treatment in saturated air. Yet even here it will be noted that in all cases the reabsorptive power of the fir is slightly greater than that of the pine. Attention, however, should be called to the fact that the reabsorptions were of such magnitude as to necessitate a much smaller scale of ordinates. Hence the apparent differences as read from Fig. 3 should be magnified fivefold to bring them to the scale of Fig. 2.

Such a magnification will make the apparent difference in behavior toward saturated air and toward water much less than appears on the plots at first glance.

The effect of capillarity will almost immediately fill the open-ended cavities of the cells and canals at the exposed surface of an immersed stick. Hence the first quarter inch shows a total moisture content, even after a single hour's immersion, far above that necessary for fiber saturation. (Data not shown in Fig. 3.) This, however, does not indicate the speed at which fiber saturation is actually attained, and since there seems to be no means of differentiating the two conditions of included moisture, such a determination does not seem possible.

While the time required for fiber saturation is not definite in the case of timber immersed in water, yet an inspection of the curves of Fig. 3 shows clearly that such saturation un-

doubtedly occurs and that it is only a matter of time whether in the case of columns or beams of timber, even though previously air-dried, for them to be reduced to the character of green wood.

Comparison of Figs. 2 and 3 beyond the first half inch from the exposed end shows that the rapidity of reabsorption is much less when the wood is immersed in water at 70 degrees than when exposed to air saturated at 120 degrees. In detail it will be noted that 24 hours in water are required to produce approximately the same reabsorption as three hours' treatment in moist air, and that the reabsorption after 48 hours' submersion is approximately that attained during a 24-hour exposure to moist air.

As previously noted, the blocks under

two woods which are under discussion.

All of the fir tested, with two exceptions, showed from 12 to 17 rings per inch measured radially. Of these exceptions one showed 10 and the other 20 rings per inch. The summer wood comprised from 30 to 60 per cent of the total growth, about one-half the total number of specimens containing between 40 and 50 per cent of summer growth. The air-dry density ranged between 31 and 36 pounds per cubic foot.

The pine under investigation (with the exception of three specimens noted later and marked S on Fig. 5) showed from 7 to 10 rings per inch measured radially. The summer wood ranged from 30 to 50 per cent of the total growth, except in specimens S. The air-dry density, except for specimens S, was between 32 and 36 pounds per cubic foot. Specimens S (three in number, see Fig. 5) had but six rings per inch, showing only 25 per cent of summer wood, and had an air-dry density of about 30 pounds per cubic foot. It is evident that the wood from which these were cut should be classed as "sound" rather than as "dense" southern pine according to the A. S. T. M. standards. The moisture-strength relations for the fir and pine will now be taken up separately and compared later. The

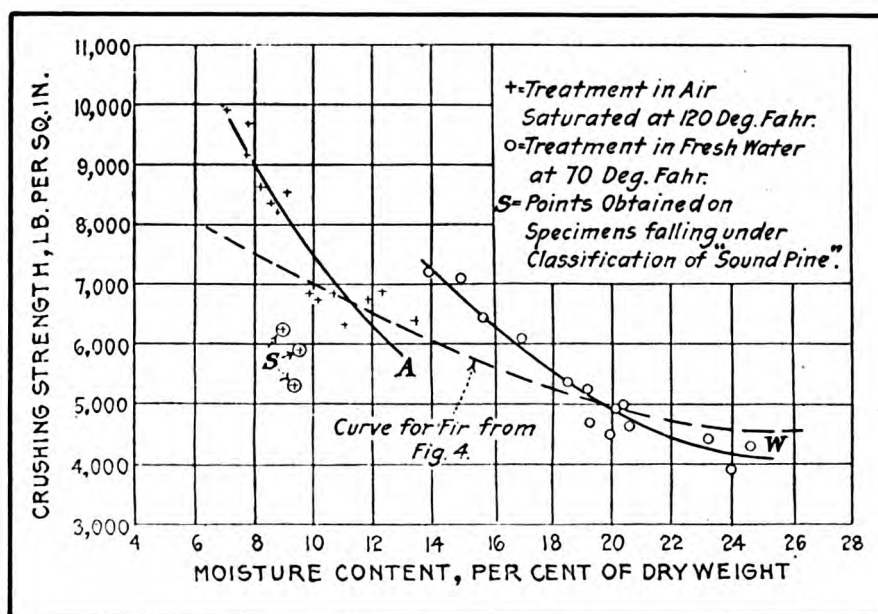


FIG. 5—RELATION BETWEEN MOISTURE CONTENT AND CRUSHING STRENGTH OF YELLOW PINE

investigation were treated in the form of specimens 2x2x8 inches. After treatment a section 1 inch thick was removed from each end, thus giving a specimen 6 inches long for the compression tests. The ends were squared in a metal miter box so that the faces subjected to pressure were as nearly parallel as possible. The tests were conducted on a 100,000-pound capacity Olsen testing machine having a ball-and-socket joint on the moving head. This should completely obviate the introduction of any eccentricity of loading, and the failure of the specimens would indicate a pure compression stress.

After failure a 1/4-inch section was removed from the specimen at the point of fracture, and from this the moisture content was obtained as previously described. Figs. 4 and 5 have been prepared to show the relations, if any exist, between the actual moisture content and the crushing strength of the

material and compared later. The most superficial glance at the plotted data will very clearly show that the compressive strength of the wood falls as the moisture content increases. The material is of organic origin and subject consequently to manifold variation. Hence it is only to be expected that the plotted points will assume a more or less "gun-shot" arrangement. In such a case the choice of the best representative curve is open to all the elements of variation arising in the personal equation of the investigator. While mathematical methods are possible in the establishment of such a curve, such a method of investigation seems hardly warranted in this instance. The curve drawn in Fig. 4 is assumed by the writer to be fairly representative and is at least indicative of certain fundamental relations.

The data were obtained as previously explained from tests made on specimens

subjected to radically different treatments. In the case of the fir, nevertheless, the resulting graph is evidently a continuous line. The inclination is somewhat sharper with the lower moisture contents and flattens out, becoming approximately horizontal at a moisture content of about 25 per cent. This corresponds very closely with the fiber-saturation point previously referred to and would seem to bear out the existing theory that only the "imbibed" moisture affects the strength in compression.

While it must be kept in mind that the values of the strengths here recorded are in no way indicative of the proper constants for use in design, yet it is felt that certain of the relations apparent are of fundamental truth. It will be noted that the treatment of wood by exposure to air saturated at a temperature of 120 degrees Fahr. results in a compressive strength of about 25 per cent less than the strength of air-dry timber. This reduction appears at about 14 per cent moisture content.

Submersion in water at 70 degrees Fahr. for a period of 117 hours produces at the point of fracture a moisture content of 26 per cent, thereby reducing the strength to a value of about 40 per cent below that for air-dry wood of the same quality.

The data recorded in Fig. 5 covering yellow pine offer certain marked variations from those shown for fir in Fig. 4, the curve for which has been transposed to this plot as a dash line. It is very obvious that the data obtained from the pine yield plotted points which cannot be satisfactorily represented by a single line. The data from the water-soaked specimen, marked *W*, yield a fairly determinate curve. The data from the specimens exposed to the moist air, marked *A*, might be reasonably well represented by a variety of lines. However, it seems fair to presume that the two lines will be of the same general type even though they are discontinuous. Such has been the assumption used as a guide in drawing the representative lines.

The generalizations for the pine are quite similar to those drawn from the graph characteristic of the effect of reabsorption by the fir. The decrease in strength is at first quite rapid with the increase of moisture content. It later flattens, becoming nearly horizontal at about 25 per cent moisture content, again indicating this value as the fiber-saturation point.

The rate of decrease in strength seems to be more rapid for yellow pine than for fir. In the case of the specimens investigated this decrease becomes about 35 per cent after 24 hours' exposure to air saturated at 120 degrees. It is only fair to suggest that this

decrease may not be due entirely to moisture.

Due to the extremely rapid reabsorption, no points were obtained for the soaked specimens between the air-dry condition and about 14 per cent of moisture. The graph *W* as drawn, however, if extrapolated as a straight line will pass very close to the data obtained from the air-dry material. This graph shows that the moisture content of about 25 per cent which was present 1-inch from the exposed end after a soaking of 117 hours, resulted in a strength nearly 60 per cent below the strength of the air-dry material.

Reasons for the Discontinuity of the Graph

The wood treated in the moist air at 120 degrees was tested immediately upon removal from the steamer. It was warm when subjected to pressure; in some cases the temperature of the inner portions was probably at least 100 degrees. Pine is a very resinous wood. At the temperatures maintained this resinous material will soften, and some of the normally solid constituents will undoubtedly become actually liquefied. The portions normally in the state of a liquid of high viscosity will undoubtedly have their viscosity considerably lowered. The effect of this action will be that of a general removal of the stiffening action of the cell contents and a possible lubricating effect tending to permit a greater freedom of movement between cells which are poorly adherent because of incidents of growth. This effect is additive to the general effect of the absorption of moisture and may well explain the sharp pitch of the curve *A*.

The temperature of the water used for the soaking treatment is probably insufficient to produce this effect. In fact, the temperature is approximately that at which the air-dry specimens were tested. It would seem, then, that the temperature factor may reasonably be eliminated from a discussion of the curve *W*. If such be the case, it is to be expected that a given moisture content when obtained in the water at 70 degrees will show a less-marked weakening effect than does the same moisture content when resulting from exposure to moist air at 120 degrees Fahr. Observing the conditions at a moisture of 14 per cent, such is found to be the case. The difference between the ordinates of curves *A* and *W* at this degree of saturation may well be taken to represent the weakening effect of heat due to softening of the resinous compounds by a heating for 24 hours at 120 degrees.

Since the quantity of resinous matter in the Douglas fir is much less than that in the pine, this temperature effect would doubtless be absent and the

resulting graph be a continuous curve, as was found to be the case.

The specimens giving the points marked *S* are of considerable interest as an exemplification of the fact that wood of coarse growth, low percentage of summer wood and corresponding lesser density yields a lower compressive strength than when the reverse conditions obtain. Though the number of pieces coming in this category is small, yet the facts point strongly toward a justification of the acceptance of the so-called "density rule" of the standards of the American Society for Testing Materials.

New Yard at Halifax

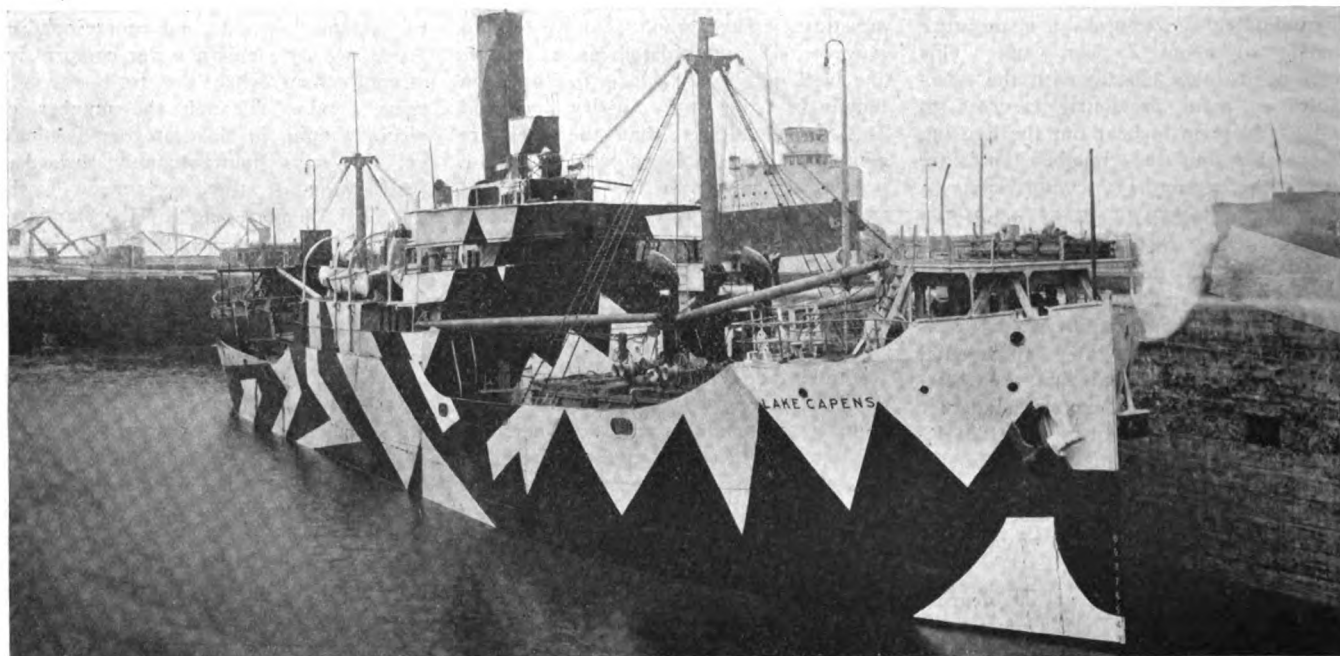
Halifax, N. S., is to have a large new shipyard. The Halifax Shipbuilders Ltd., has been organized by Canadian business men including James Carruthers and J. W. Norcross of the Canada Steamship Lines, Ltd., and R. M. Wolvin, president of the Montreal Transportation Co., Ltd. Three berths will be built designed to handle ships of approximately 10,000 tons. The property secured is the site adjoining the drydock and known as the Acadia Sugar Refinery property. The drydock, which was damaged in the recent explosion, is to be repaired and put in shape to handle large ships. The new yard will build the largest boats ever constructed in Canada and the first one is expected to go in commission in about 15 months. The plant will cost from \$3,000,000 to \$4,000,000 and will employ between 3000 and 4000 men. The Canadian government has given or promised to give orders for a limited number of modern, 10,000-ton freighters at a fixed price.

South Will Build Big New Fleet

Decision of the shipping board to award contracts to southern shipyards for 200 more vessels has been conveyed to all the shipyards in that section. The new ships will be of the revised Dougherty type, similar to WAR MYSTERY and WAR MARVEL, launched recently by the National Shipbuilding Co., at Orange, Tex. The announcement says the minimum size of these boats is to be 4600 tons, and that the number will be increased to 400 if the speed in output equals that estimated by L. Prior, naval architect, on whose report the decision of the board was based. Planking laid on diagonally, in what is known as the "laminated" method of construction, will be used, eliminating the necessity for timbers of such great length, width and thickness as those demanded for the Ferris type ship. Maximum width of timbers in these Dougherty type ships is 24 inches.

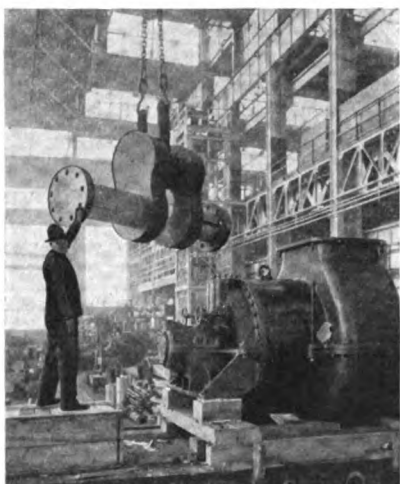
Photographs From Far and Near

Contributions for These Pages Are Solicited



CUBIST ART EXEMPLIFIED IN A CAMOUFLAGED STEAMER ON THE UPPER LAKES

The strange scheme of decoration is remarkably effective in deceiving the eye of the waiting Hun sub. These boats are completed even to their war paint in the lake yards



THESE ARE ONLY A FEW OF THE COUNTLESS DETAILS INVOLVED IN BUILDING THE MERCHANT FLEET

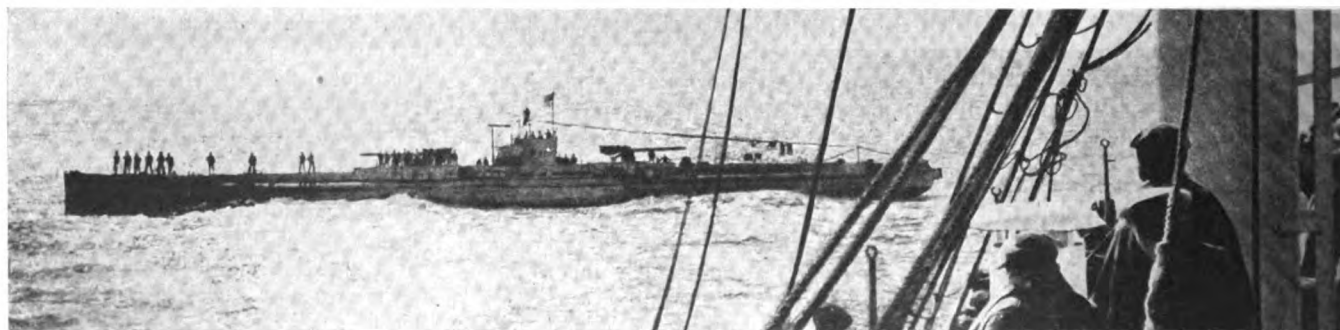
Complete Turbine Engine and Crankshaft



Heating Rivets Inside a New Hull



Milling the Flange of Turbine Shaft



Copyright Underwood & Underwood

LARGE TYPE CRUISER SUBMARINE STOPS SPANISH LINER OFF CADIZ

Twenty Hun officers and men were searching this Spanish steamer, the INFANTA ISABEL DE BORDON, while the monster sea wolf circles menacingly about. The remainder of the U-boat crew are shown on the deck of their craft

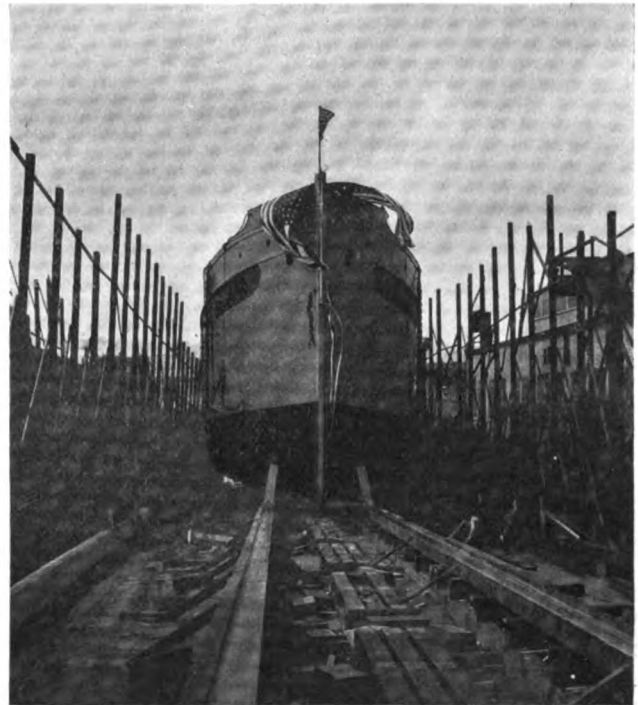
Latest Marine News in Pictures

Payment Will Be Made for Acceptable Photographs

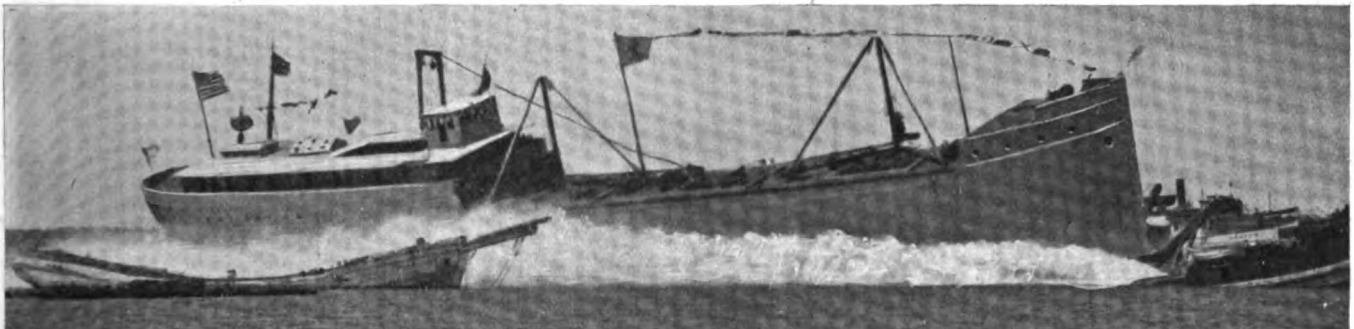


Copyright Underwood & Underwood

LINKING THE GREAT LAKES WITH THE ATLANTIC
Six miles of the new \$150,000,000 canal at the north end of Lake Champlain in panorama from Whitehall, N. Y.



LAUNCHING A NEW PACIFIC BUILT VESSEL
U. S. Emergency Fleet steamer Wallowa is launched by Supple-Ballin Shipbuilding Corp., Portland, Oreg.



CONTRIBUTION FROM THE GREAT LAKES TO THE WOODEN SHIP PROGRAM

Formerly the lakes boasted an extensive wooden shipbuilding industry, but remote raw materials forced its abandonment. This vessel, built at Sturgeon Bay, Wis., is the only one constructed of wood in recent years



MAKING A SHIP PROPELLER

The first step in building the mold in which the propeller is cast—Note the brick foundation necessary

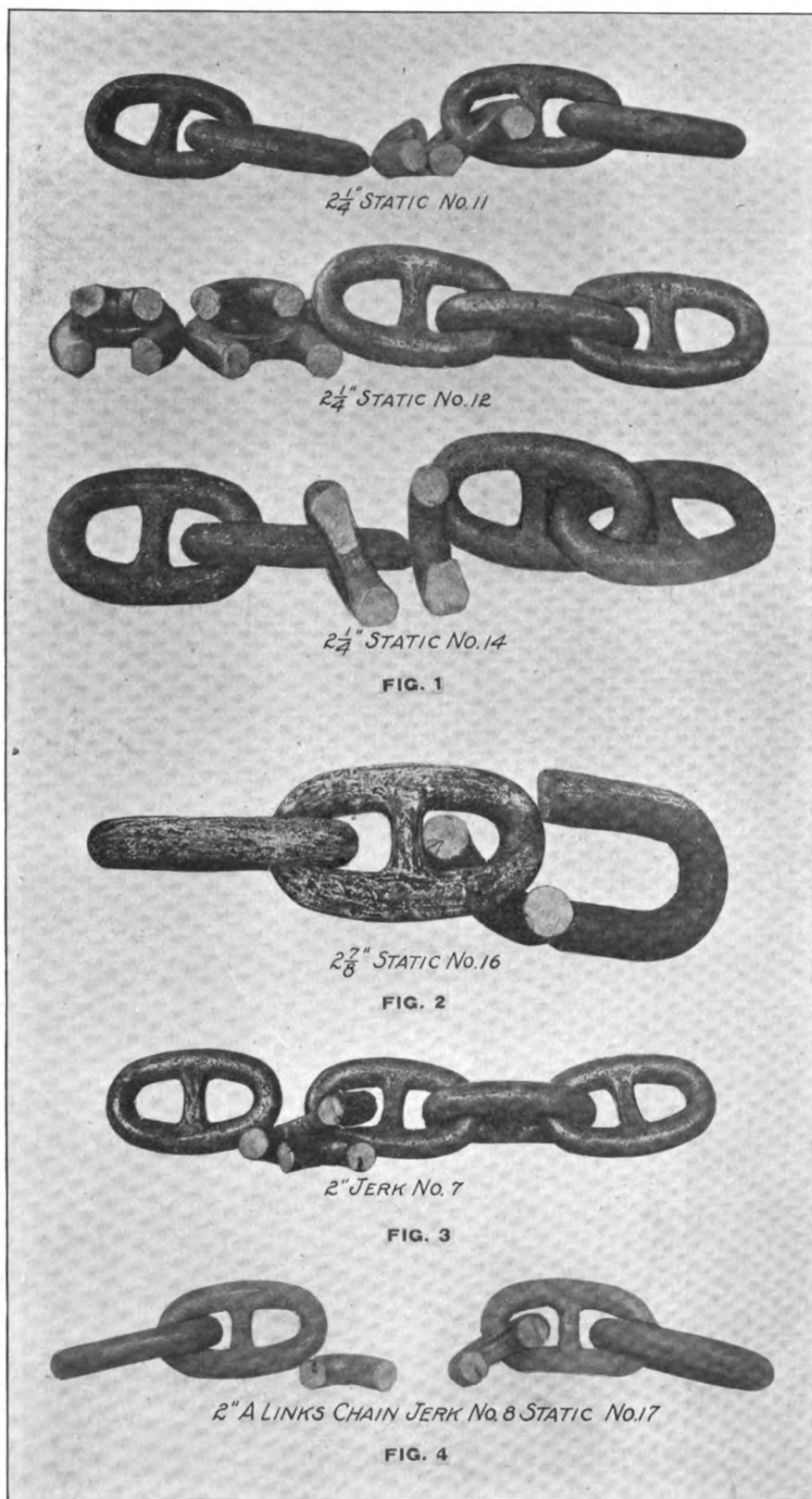


SOUTHERN YARD LAUNCHES ITS BIT

Floating the ocean-going tug, Hermanson, built by the Gulf Shipbuilding Co., Madisonville, La.

Tests of Cast Steel Anchor Chain

New Casting Process for Producing Heavy Chain Developed and Approved—Manufacturing in Quantities to Begin Soon



ANCHOR CHAINS OF VARIOUS TYPES AFTER UNDERGOING TESTS. ACCOMPANYING TABLES GIVE DETAILED RESULTS

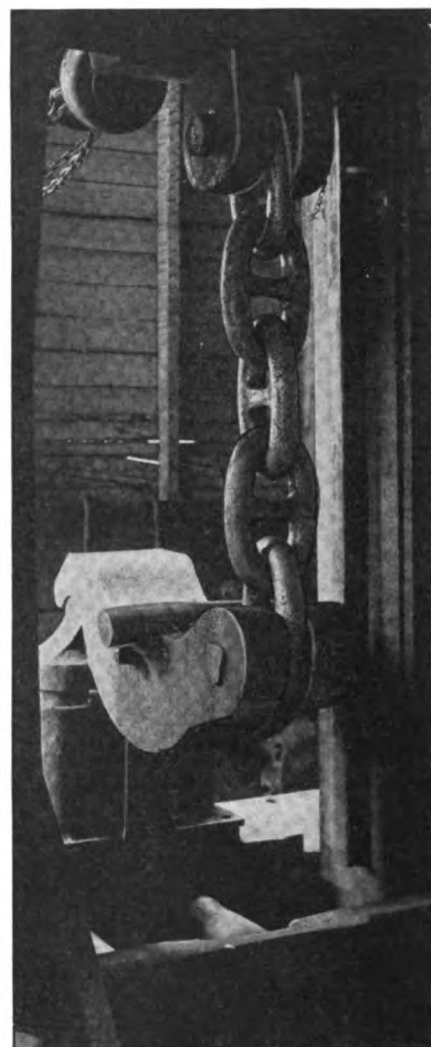


FIG. 5—DYNAMIC JERK TESTING MACHINE

STUD link anchor chain made of electrically refined steel will be manufactured in a new plant under construction at Cleveland by the National Malleable Castings Co., Cleveland. Preliminary work of experimentation and of developing the molding practice has been under way for some months. Recently tests were conducted to determine the strength of the chain and as a result the approval both of the American Bureau of Shipping and of Lloyd's has been received.

The National company took up the investigation of the new method of producing anchor chain at the request of the council of national defense which had been studying the situation brought about by the enormous expansion in demand for chain to meet the huge shipbuilding program. Government official, including navy officers, have followed the work closely.

The company expects to begin manu-

facture in August and plans to produce in quantity electric steel anchor chain in all sizes, from $1\frac{3}{8}$ inches up to the largest required.

The accompanying tables and illustrations show the equipment used and the results obtained in the recent tests. In Figs. 1, 2, 4 and 10 are shown chain used in static tests. Figs. 3, 4, 7, 8, 9 and 10 show chain used in jerk tests. Detailed results are given in Tables II and III. The machine used in conducting the dynamic jerk tests is shown in Figs. 5 and 15. The method of conducting static tensile tests is illustrated in Figs. 6 and 13. Other methods developed for testing are illustrated in Figs. 11, 12 and 14. Results of a second series of tests are given in Table I.

Static and dynamic tests of the chain were made at the Sharon, Pa., plant of the National company. Government officials, and representatives of manufacturers, the American Bureau of Shipping and Lloyd's were present.

The tests were conducted on a static test machine of 1,000,000-pound capacity and on a standard master

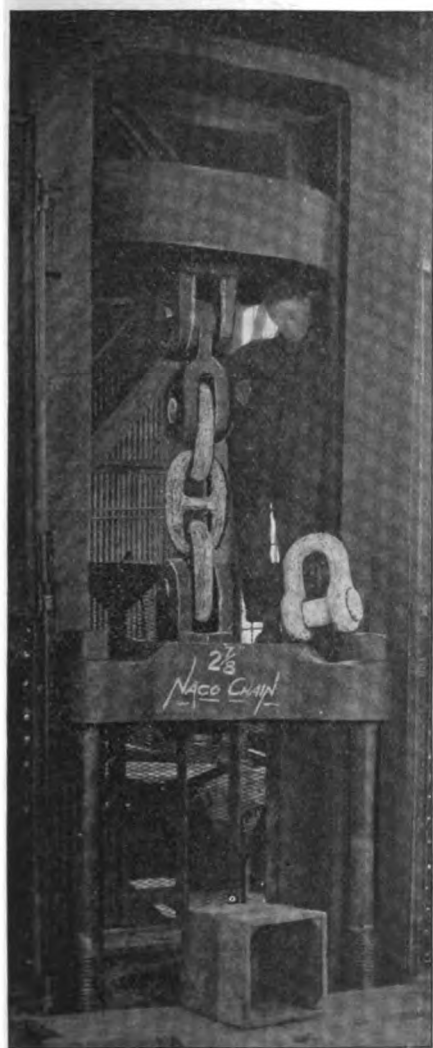
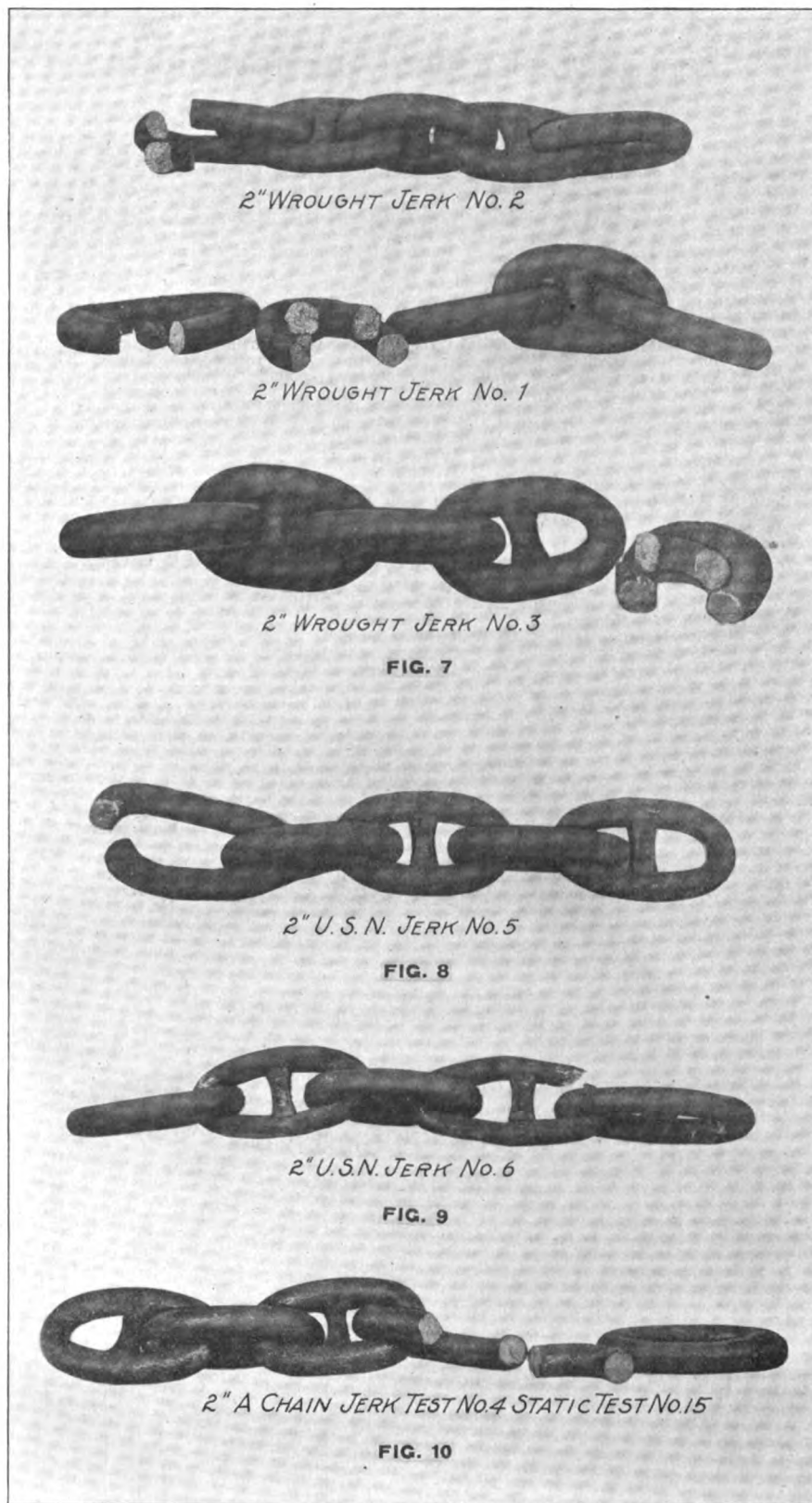


FIG. 6—MACHINE FOR CONDUCTING STATIC TENSILE TESTS



ANCHOR CHAINS OF VARIOUS TYPES AFTER UNDERGOING TESTS. ACCOMPANYING TABLES GIVE DETAILED RESULTS

car builders drop test machine. The chains subjected to the static test were supported in the test machine by coupling each end link to the crosshead of the machine by means of a testing shackle and pin.

Chains consisting of five common A links were subjected to a light load

to reduce any possible high spots on the bearings between the links. This load was then released and a measurement over the three middle links was laid off. The elongation over this measurement was then obtained on the proof load, the breaking load and the breaking load plus 40 per cent. The first two

Test of Cast Steel Anchor Chain

Table I
METHOD OF TESTING

These tests were conducted in a static test machine of 1,000,000 pound capacity and a standard master car builders drop test machine. Two kinds of tests were made in the static machine. The first consisted of supporting separate 2-inch links on 2-inch round pins spaced 8 inches from center to center. A third 2-inch round pin was placed transversely across the link at its center and the load applied on this link. Fig. 12 shows the principle of conducting this test. The second test consisted of supporting a 2-inch chain consisting of three common *A* links in a frame, as shown in Fig. 11, and applying the static load at the center of the middle link until destruction.

Two kinds of tests were also conducted in the drop test machine. The first kind consisted of supporting a 2-inch chain consisting of five common *A* links in a vertical position by supporting the upper link in a shackle bar and the lower link in an equalizer bar, by means of shackle pins and in such manner that one half the energy developed from the falling tup will be imposed upon the chain thus suspended and in the form of a dynamic jerk. Fig. 15 illustrates this method of testing. The second kind of drop test was conducted on separate common *A* links by supporting the link in a standard MCB knuckle pin test block. In this case the supports were $\frac{3}{4}$ -inch radius and 10-inch center to center and the dynamic load was applied transversely at the center of the link and through a plunger having a $\frac{3}{4}$ -inch radius at its nose. Fig. 14 illustrates this method of testing.

ANALYSIS OF TESTS

For convenience these various tests are classified into groups, according to the kind of test made. Group No. 1 embodies the transverse tests conducted on separate common *A* links in the static test machine. Test group No. 2 embodies the tests conducted on the 3-link chain in the static test machine. Test group No. 3 embodies the transverse tests conducted on separate links in the drop test machine. Test group No. 4 embodies tests conducted on 5-link chains in the drop test machine.

TEST GROUP NO. 2 Wrought Iron 3-Link Chain—Static Test

Test No. 3:—Center link fractured through end at 278,500 pounds load.

Test No. 4:—Center link fractured through end at 237,500 pounds load.

Test No. 5:—Center link fractured through end and side at 230,900 pounds load.

Company's Steel—3-Link Chain—Static Test

Test No. 6:—Center link fractured through one side at 209,000 pounds load.

Test continued and fractured remaining side at 93,800 pounds load.

Test No. 7:—Center link fractured through one side at 231,400 pounds load.

Test No. 8:—Center link fractured through one side at 210,000 pounds load.

TEST GROUP NO. 3

Separate link supported in M. C. B. pin test block. Weight of Tup 1640 pounds.

Test No.	Material	Fall of tup, feet	Deflection, degrees	Remarks
9.....	Wrought	6	21	No fractures
10.....	Wrought	7	32	No fractures
11.....	Wrought	8	..	Link broke
12.....	Wrought	8	36	No fractures
13.....	Company's steel	8	11	No fractures
14.....	Company's steel	8	12	No fractures
15.....	Company's steel	10	*	Link broke 2nd blow at 10 ft.
16.....	Company's steel	12	..	Link broke

*Not measured.

TEST GROUP NO. 4

Test No. 17—Wrought Iron 5-Link Chain

3 blows of 1640 pounds falling 5 feet..... Chain O. K.
1 blow of 1640 pounds falling 10 feet..... Chain broke

Test No. 18—Wrought Iron 5-Link Chain

3 blows of 1640 pounds falling 5 feet..... Chain O. K.
3 blows of 1640 pounds falling 10 feet..... Chain O. K.
3 blows of 1640 pounds falling 15 feet..... Chain O. K.
2 blows of 1640 pounds falling 20 feet..... Chain broke

Test No. 19 Company's Steel 5-Link Chain

3 blows of 1640 pounds falling 5 feet..... Chain O. K.
3 blows of 1640 pounds falling 10 feet..... Chain O. K.
3 blows of 1640 pounds falling 15 feet..... Chain O. K.
3 blows of 1640 pounds falling 20 feet..... Chain O. K.
3 blows of 1640 pounds falling 25 feet..... Chain O. K.
3 blows of 1640 pounds falling 30 feet..... Chain O. K.
3 blows of 1640 pounds falling 35 feet..... Chain O. K.

Test discontinued after three blows at 35 feet with no apparent distortion or destruction of any one of the links.

TEST GROUP NO. 1

Wrought Iron Link (Supported 8-inch Centers)

Test No. 1

Load, pounds	Deflection, inches
25,000.....	0.00
50,000.....	0.01
75,000.....	0.06
100,000.....	0.33
125,000.....	0.83
145,000.....	1.66

Support pins slipped from under the link at 145,000 pounds load. Total number of degrees through which link bent 53.5.

Company's Steel Link (Supported 8-inch Centers)

Test No. 2

Load, pounds	Deflection, inches
145,000.....	0.00
161,000.....	0.01
225,000.....	0.17

Fractured one side of link close to stud at load of 237,300 pounds. Test continued and fractured remaining side at 145,000 pounds load. Section of metal through fracture shows solid.

loads were in accordance with specifications by Lloyd's Register of Shipping for the respective size chain. The third load is the second load increased 40 per cent. After these three loads had been applied and released and the elongation measured, a load to destruction was then applied.

Test chains consisting of two sections of *A*, *B* and *E* links shackled together with shackle *D* were tested in the same manner except that the elongation was taken over the two *B* links. The $2\frac{7}{8}$ -inch chain tested consisted of one each of the *A*, *B* and *E* links and the reading taken was over the *B* link only.

Chains tested in the drop test machine were all of the 2-inch size and consisted of five common *A* links each. These chains were installed in the test machine by connecting the upper link in a shackle bar and the lower link in the equalizer shackle by means of shackle pins passing through the eye of each link. This arrangement was such that one-half the energy of the falling tup from any given height would be dissipated in the form of a dynamic stress through all the links of the chain. The tup weighed 1640 pounds.

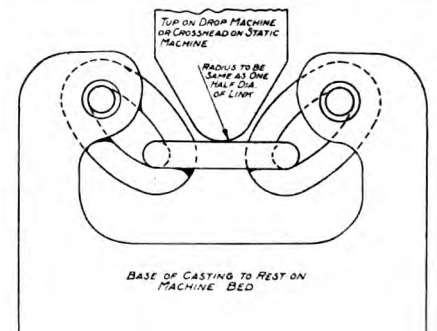


FIG. 11

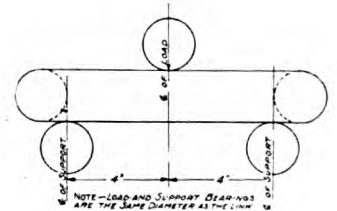


FIG. 12

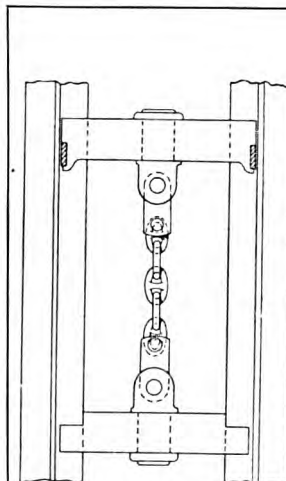


FIG. 13

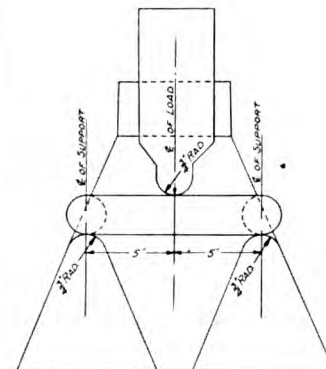


FIG. 14

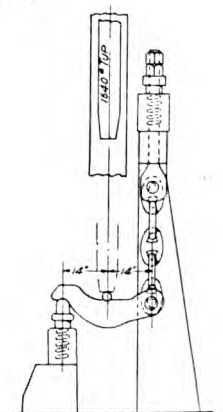


FIG. 15

Test of Cast Steel Anchor Chain

ANALYSIS OF TESTS

The following tabulations show the analysis of the tests conducted. Table III includes all static tensile tests on the various sizes of chain consisting of five common *A* links in which case the elongation was measured over the three middle links. Tests Nos. 7, 8 and 9, however, consist of two sections of *A*, *B* and *E* links connected with shackle *D*, in which case the elongation was measured over the *B* links and should thus include the elongation of two *B* links, two *E* links and shackle *D*. Table II shows the analysis of dynamic jerk tests conducted on the various kinds of chain, all of which were the 2-inch size. These chains all consist of five common *A* links and the elongation was measured as indicated over the three middle links.

Table II

Test chain, No.	Size in.	Material	—Elongation after 3 blows at, feet—					Total blows at 25 feet	Total blows at 30 feet	Total blows at 35 feet	Chain broke on	Total elongation, inches	Remarks
			5 Inches	10 Inches	15 Inches	20 Inches	25 Inches						
1	2	Wrought	0.02	0.05	0.15			..	..	..	1st at 20 ft.	0.15	Broke Nos. 4 and 5 links.
2	2	Wrought	0.00	0.02				..	..	..	2nd at 15 ft.	0.02	Broke No. 1 link.
3	2	Wrought	0.00	0.02				..	..	..	2nd at 15 ft.	0.02	Broke No. 1 link.
4	2	Company's steel	0.01	0.05	0.09	0.13	0.27	50	20	..	None	0.65	Chain installed in static machine. See static test No. 15.
5	2	U. S. Navy	0.10	0.34	0.68	1.37	2.21	6	..	..	6th at 25 ft.		Broke No. 1 link through weld.
6	2	U. S. Navy	0.06	0.32	0.74	1.32	2.08	10	2	..	None	3.85	Surface fractures in all links. Chain installed in static machine and broke No. 2 at about 241,000 pounds.
7	2	Company's steel	0.02	0.02	0.03	0.05	0.10	10	1	..	1st at 30 ft.	0.24	Broke No. 4 link. Section shows solid.
8	2	Company's steel	0.08	0.10	0.15	0.19	0.26	10	10	10	None	0.72	Chain installed in static machine. See static test No. 17.

Relative to the analysis in Tables III and II, a few interesting features in connection with these tests follow:

TABLE II, TEST NO. 4

This chain was subjected to:

3 blows at.....	5 feet
3 blows at.....	10 feet
3 blows at.....	15 feet
3 blows at.....	20 feet
50 blows at.....	25 feet
20 blows at.....	30 feet

At the completion of this test, the elongation over three links measured 0.65 inch. The test was then discontinued in the drop test machine and the chain installed in the static test machine and subjected to the proof test, breaking test and breaking test plus 40 per cent and was then loaded to destruction, during which No. 2 link broke at 452,700 pounds. The sections through the fracture show solid metal. This test is also No. 15 in Table III.

TABLE II, TEST NO. 8

This chain was subjected to a test of:

3 blows at.....	5 feet
3 blows at.....	10 feet
3 blows at.....	15 feet
3 blows at.....	20 feet
10 blows at.....	25 feet
10 blows at.....	30 feet
10 blows at.....	35 feet

The elongation over three links after this test was 0.72 inch. The test was then discontinued in the drop test machine and the chain installed in the static machine. The proof load, the breaking load and the breaking load plus 40 per cent were applied and released and the chain was then tested to destruction, during which No. 3 link broke at 467,400 pounds. The section through the fracture shows solid metal, having a small shrinkage on one side. This test is also No. 17 in Table III.

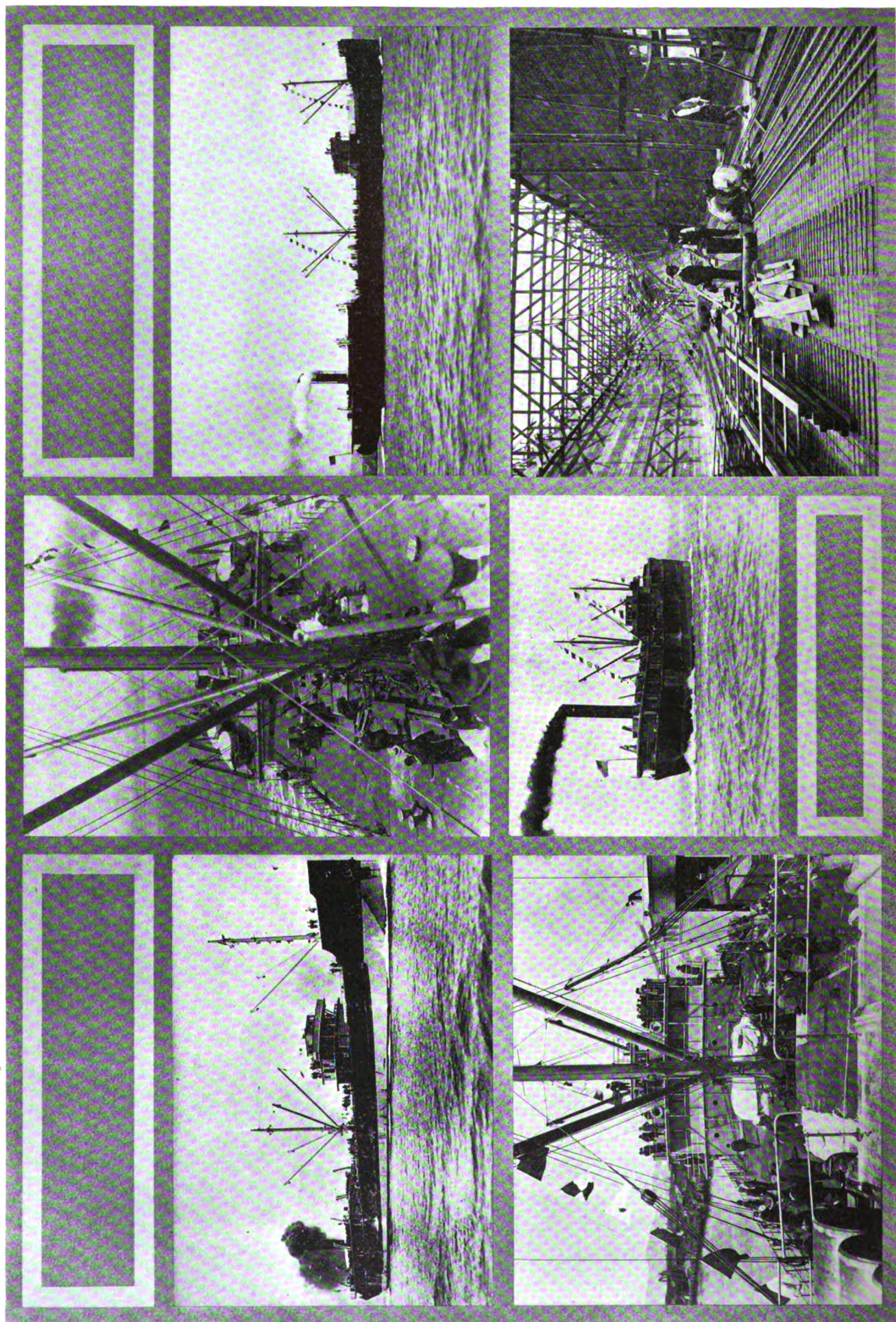
TABLE III, TEST NOS. 13 AND 14

These tests were made for the purpose of observing the effect of certain defects in steel chain. In each of these chains No. 3 link was defective on account of a shrinkage on one side of the link and in alignment with the stud. In test No. 13, the defective link broke through the defect at 502,400 pounds. In test No. 14, No. 5 link broke at 491,900 pounds, section solid. The remaining four links were again installed in the machine and loaded to destruction, during which No. 3 link broke through the defect at 502,200 pounds. While neither of the above chains was suitable for commercial purposes, it is interesting to note the slight effect of the defects.

Table III

Test No.	Size, in.	Material	Wt. of test chain, lbs.	—Elongation after—			Chain broke at, lbs.	Remarks
				Proof load, in.	Break- ing load, in.	Breaking load plus 40% in.		
1	1½	Company's steel	40	0.03	0.04	0.08	213,600	Broke No. 3 link. Section of metal solid.
2	1½	Company's steel	40	0.03	0.04	0.07	198,700	Broke No. 3 link. Section of metal few small blow holes.
3	1½	Company's steel	40	0.02	0.04	0.09	180,700	Broke No. 3 link. Section of metal honey-combed.
4	2	Company's steel	123	0.03	0.06	0.13	456,400	Broke No. 4 link. Small shrinkage in each fracture.
5	2	Company's steel	122	0.03	0.06	0.09	400,000	Broke No. 3 link. Section shows solid.
6	2	Company's steel	122	0.03	0.05	0.10	403,000	Broke No. 4 link. Section shows solid.
7	2	Company's steel	225	0.20	0.27	0.45	381,900	Broke top <i>E</i> link. Section shows few small blow holes.
8	2	Company's steel	223	0.10	0.22	0.63	346,500	Broke bottom <i>E</i> link. Section shows few small blow holes.
9	2	Company's steel	223	0.07	0.14	*	316,100	Broke bottom <i>E</i> link. Section shows few small blow holes.
10	2¼	Company's steel	174	0.05	0.09	0.20	494,400	Broke No. 1 link. Section shows solid.
11	2¼	Company's steel	174	0.07	0.13	0.33	495,400	Broke No. 3 link. Section shows solid.
12	2¼	Company's steel	175	0.06	0.11	0.22	513,200	Broke No. 5 link. Section shows solid.
13	2¼	Company's steel	172	0.02	0.05	0.14	502,400	Broke No. 3 link. Fractured through defect.
14	2¼	Company's steel	171	0.03	0.07	0.16	491,900	Broke No. 5 link. No. 3 link defective.
15	2	Company's steel	...	0.65	0.65	0.67	452,700	Broke No. 2 link. Section shows solid. See also jerk test No. 4.
16	2¾	Company's steel	251	0.00	0.00	0.00	764,700	Broke <i>E</i> link. Section shows few blow holes in one side.
17	2	Company's steel	..	0.72	0.73	0.74	467,400	Broke No. 3 link. Section shows small shrinkage one side. See also jerk test No. 8.

*Not obtained.



Photos copyright by Underwood & Underwood, International Film Service and Charles Feinberg
FAMOUS CONCRETE STEAMER FAITH ON TRIAL TRIP. DECK SCENES AND A CONSTRUCTION VIEW ALSO ARE SHOWN

Plan to Transfer Faith to Atlantic

Successful Trial Trip of Big Concrete Ship May Put Her in Cuban Trade—Description of Boat and Results of Her Trials

AFTER demonstrating her seaworthiness on the first sea voyage from San Francisco to Seattle—during which she encountered gales from 75 to 80 miles per hour in velocity and smashed through waves more than 35 feet in height—the pioneer concrete steamer FAITH is scheduled to leave for Atlantic waters about the middle of June. The FAITH may be placed in the sugar trade out of Cuba, the rate for the 500-mile run being about the same as that for the 2000-mile service between San Francisco and Honolulu. The primary purpose is to combat by demonstration the "keen opposition to the government's concrete shipbuilding program that has developed in Washington," according to W. Leslie Comyn, president of the San Francisco Shipbuilding Co., which built the FAITH.

While such a conclusive demonstration may be needed to convince official Washington that the concrete type of vessel is no longer an experiment, the FAITH has demonstrated her complete success to the satisfaction of western shipping men.

Her Trial Trip

The FAITH arrived in Seattle on her first sea voyage at 3 o'clock on May 29, six days and four hours out of San Francisco. The running time was slow, but fully equals that averaged by other vessels equally powered when running head on into the gales and seas encountered by the concrete. The winds mounted to a velocity of 75 and 80 miles an hour at times, according to the vessel's log, while she was smashing into and through seas more than 35 feet high. This tendency to dive into, rather than ride the waves, while it kept her deck awash during the storm, practically eliminated the roll.

Even at the height of the storm there was a singular lack of the vibration to be found in wooden and steel vessels in similar circumstances, and at no time was more than 1500 horsepower utilized, although 1750 horsepower was available.

This, of course, contributed to the slowness of the running time, but this was a voyage to demonstrate seaworthiness and not speed. F. R. McMillan, a representative of the concrete department of the United States shipping board, who made the trip aboard the

FAITH, has this to say concerning the performance of the vessel:

"Continuous stress records at various parts of the ship were taken by means of recording stress gage especially designed for this purpose. The seas encountered were very heavy and gave a good opportunity to study the action of the reinforced concrete hull under conditions ordinarily to be expected in service." The trip was entirely successful with every reason to expect

Secures High Rating

THE FAITH was rated at A1 on seaworthiness by the surveyor who made the trip to Seattle and the vessel is considered an excellent risk, according to the underwriter's report. The only thing mentioned as needing improvement is the power. The intimation is made that the vessel needs higher power to drive her at fair speed in any but the fairest weather. While heading into the gales encountered, the vessel's speed was from two to four knots an hour.

excellent future performance, in the opinion of McMillan and other shipping board representatives.

"The FAITH acted just the same as any other good ship. We had some very bad weather and some good. That is all I care to say," was the pauciloquent comment of Capt. R. C. Connell, commander of the FAITH, which should be sufficient unless one expects a boat built to float to fly.

Description of New Ship

The FAITH was launched at Redwood City, Cal., on May 14. As is generally known, she is the first ocean-going concrete vessel to be built in the United States and she is the largest in the world at this time, although the new concreters now being planned by the engineers of the San Francisco Shipbuilding Co., will be of 7500 tons burden, or half again as large. The FAITH's measurements are: 7900 tons displacement, 5500 tons burden and 2700 tons weight of hull; 336 feet long, 45 feet beam and 31 feet molded depth. At

her launching she drew 8 feet of water at the bow and 10 feet at the stern. The floor of the vessel is 4½ inches thick with sides 4 inches thick and she is reinforced in the bow with a great steel shoe. Steel aggregating 550 tons forms an intricate network upon which the concrete is laid. The three holds of the vessel are placed well forward and are divided by six concrete bulkheads. A watertight wooden flooring rests on the bottom beams and forms an inside hull. The main deck is of wood, laid on concrete stringers, and the cabin is of wood. The shelter deck is concrete.

Engine Installed in Record Time

Due to the untiring efforts of George Magruder, formerly port engineer for the American-Hawaiian company, who remained constantly on the job for three days and nights, the FAITH was enabled to make her trial trip on schedule time after a record engine installation of 44 days. The best previous installation up to that time had been a record of 62 days made at the Union plant of the Bethlehem Shipbuilding Corp. The trial run was marked by speed and the lack of vibration which has been so much commented upon. The FAITH averaged more than 11 knots over the entire course off California City, which was 10 per cent better than was expected from her. Concrete boilers were suggested on this trip and the idea is being worked out at the Union plant.

This was on May 5. On May 15, the FAITH was taken outside the Heads for a successful ocean trial trip at the request of the Emergency Fleet corporation officials and she sailed for the north with a full cargo of salt a week later.

A comparison of the plans and specifications of the FAITH and those now completed by the engineers of the San Francisco Shipbuilding Co., for the next concrete ship to be built reveals that there will be little in common between the two. There is so much difference that the FAITH may be compared to a scow and the next vessel to be built to a real steamer.

The FAITH, insofar as her lines are concerned, is practically an oblong box with the bow and stern tapered to a point, while the new vessel will be

molded much more gracefully. In addition it has been found advisable to thicken the skin a bit and make other slight changes, for when the FAITH was placed in drydock after her launching it was found that certain weaknesses had already developed. That there was no occasion for uneasiness has been demonstrated on the trial and actual trips of the vessel.

The San Francisco Shipbuilding Co., pioneer in this country in the construction of ocean-going concrete steam-

ers, is backed by 10 San Francisco shipping men, each of whom subscribed \$25,000 to the company's capital. This quarter of a million dollars was the amount estimated to be necessary to put the first vessel in service. Only \$15,000 was expended in preparing the yard as compared with the half-million investment necessary for steel vessel construction. The cost of building a concrete vessels is, of course, much less than the cost of one of steel, while the additional weight of the concreters

is about 20 per cent. The time of building is about the same when the three weeks necessary to age the concrete is considered.

When the government announces the official location of the concrete shipyard plant on San Francisco bay in which eight vessels of the new 7500-ton type are to be built, the San Francisco Shipbuilding Co. will receive a superintending contractor's or engineering fee of \$30,000 for each of the vessels ordered to be built.

Washington's Views on Concrete Ships

BY M. L. FEISER

Washington Editor, The Marine Review

PLUNGING into an 85-mile gale almost as soon as she left port, with waves running 35 feet high keeping her decks continually awash, the FAITH, a 5000-ton cargo steamer, the first of the American vessels built of concrete, made her maiden voyage from San Francisco to Vancouver, B. C., with a cargo of salt and copper ore without shipping a drop of water. On June 9 she began her return trip to Seattle and San Francisco.

Such is the story told at Washington of this pioneer craft which, according to her owners, has pointed the way to a new type of construction which will exert a powerful influence on the shipbuilding industry of the country and throughout the world. However opinions may differ on this point, the story of the FAITH cannot be forgotten even should she be the last of her class.

Upon completion of her trip, her skipper, Capt. R. C. Connell, wired the shipping board that she acted like any steel or wooden vessel he had ever handled and that she stood the test of the rough sea as well as any veteran bottom. Witnesses of her effort on this occasion were F. R. McMillen and H. S. Loeffler, Emergency Fleet corporation engineers, and C. C. Brush of the lighthouse service.

Scientists made the trip also and it is said their records show the test of strength, of vibration and of other qualifications of seaworthiness equalled in many instances and surpassed in others the records of steel or wooden ships. Her speed is reported at Washington as about 11½ knots per hour, although her steam pressure is said to have fallen 15 to 20 pounds below the required minimum.

The FAITH was built in approximately six weeks. She required about 1500 cubic yards of concrete poured around 550 tons of steel reinforcing bars. Her total cost is said to be close to \$750,000 or about \$150 per deadweight ton, complete. Experts say concrete ships re-

quire about one-tenth the labor employed in constructing steel or wooden vessels and that very little of that need be skilled.

The successful demonstration of this new boat has already interested the shipping board. The Emergency Fleet corporation has let contracts for 18 such ships, nearly all tankers, and has made appropriation for 24 more. These are in addition to numerous concrete barges and tugs.

The 42 concrete ships will add 298,500 tons to the total tonnage to be delivered under the shipping board's schedules. Most of them will be tankers of 7500 tons each, capable of carrying 50,000 barrels of oil. Each is to have 2800 horsepower and a speed of 10½ knots. There will be some 5000-ton cargo ships and others of 3500 and 3000 tons.

The construction of these ships is to be carried out on 20 ways, four each in five government-owned yards. They will be built under what is known as agency contracts. At Wilmington, N. C., the Liberty Shipbuilding Co. will build eight. So will the San Francisco Shipbuilding Co., the builder of the FAITH construct eight. The other three yards are at San Diego, Cal., operated by Schofield Engineering Co.; at Mobile, Ala., operated by Fred J. Ley & Co.; and at Jacksonville, Fla., operated by A. Bentley & Sons Co. In addition, there are two private concrete shipyards, one at New York city and the other at Brunswick, Ga.

There is now before congress a bill to authorize \$50,000,000 for concrete ships, of which \$15,000,000 is to be appropriated. The bill was introduced by Senator McCumber and was referred to the appropriations committee of the house, where, it is said, efforts are being made to permanently pigeon-hole the measure.

Regardless of what the house committee does with the bill, there is nothing to prevent the shipping board to

make such appropriations as it may see fit out of its own funds which congress authorized for ships. The type of vessel was not specified. Chairman Hurley of the shipping board, asked for the \$50,000,000 authorization, however, upon the authority of the President.

Air Hose

The United States Rubber Co., New York, in a circular issued recently, points out the importance of air hose in riveting. A remarkable riveting record made by a gang of men at the South Brooklyn yard of the Morse Dry Dock & Repair Co. is described. The gang of six men, during a period of 4 hours and 10 minutes, drove 1480 regulation size, ¾-inch buttonhead rivets.

Although they were forced to travel 34 feet for every 18 rivets driven, and worked on girders on which the rivets were 12 inches apart, each hour they increased the number driven. In the first hour, 352 rivets were driven and during the fourth hour, 362 rivets.

Propeller Design

The American Screw Propeller Co., Philadelphia, has issued a booklet pertaining to propeller design. The company specializes in such work. The booklet contains an interesting history of screw propulsion from its infancy to the present time, and also complete data necessary for the designing of screw propellers. This gives the shipbuilder a complete list for making up specifications to be used in ordering propeller designs. Many testimonial letters are included in the booklet, together with a list of large shipbuilders and steamship operators who have used the company's designs.

A record of 12 frames raised in a 10-hour day has been set at the National shipyard, Orange, Tex.

Marine News in a Personal Way

Intimate Gossip About What Leaders in the
Maritime World Are Doing

HOWARD COONLEY, formerly president of the Walworth Mfg. Co., Boston, has assumed the duties of vice president of the Emergency Fleet corporation, serving jointly with Charles Piez as first assistant to Charles M. Schwab, director general. He will have full charge of the general administration work of the corporation, including contracts, purchasing, finance and accounting. Although only 39 years of age, Mr. Coonley has had a remarkably successful business career. In 1899 he graduated from Harvard university, and a few years later, founded the Coonley Mfg. Co., Chicago. Five years ago he was called to Boston as president of the Walworth Mfg. Co., and since his connection with the company, its business has increased sixfold. At the time of his selection as vice president of the Fleet corporation he was a director of the National Bank of Boston, the Link Belt Co., B. F. Avery & Sons, Inc., the Advance Rumley Co., and several other companies. He also was vice president of the Boston chamber of commerce, and the Associated Industries of Massachusetts, and a member of the war emergency industrial commission of Massachusetts. He has severed his connections with these various enterprises and will devote his entire time to the nation's shipping program.

* * *

WILLIAM R. WILSON, until recently secretary of the Alberger Pump & Condenser Co., New York, has been elected vice president, and **RICHARD C. WILLIAMS** has been elected secretary of the company.

* * *

A. E. HOWARD, formerly production engineer for Ingersoll-Rand Co., Phillipsburg, N. J., has accepted a similar position with Manning, Maxwell & Moore, and will be located at the Ashcroft plant, Bridgeport, Conn., for the next two months.

* * *

JONATHAN A. WILSON, until recently traveling engineer for the Babcock & Wilcox Co., Bayonne, N. J., has accepted the position of purchasing agent for the Todd Shipyards Corp., New York.

* * *

JOHN J. EASON has accepted the position of works manager with the United States & Cuban Allied Works Engineering Corp., operating the Havana Iron

Works and the Havana Dry Dock Co., in Cuba. Mr. Eason was formerly connected with the Havana Marine Railways, Inc., Havana, Cuba, in the capacity of general superintendent.

* * *

GEORGE E. BARRETT, until recently affiliated with the Sprague Electric Works, Bloomfield, N. J., has assumed the



HOWARD COONLEY

duties of inspector of naval construction, bureau of construction aid repair, Washington.

* * *

M. H. SUTHERS has resigned as traffic manager of the States Marine Commercial Co., Inc., and has joined the staff of L. Van Praagh, 42 Broadway, New York City, freight insurance and ship agent.

* * *

M. T. NOBLETT has severed connection with Norton, Lilly & Co., to become associated with the various enterprises of R. G. Narelle, Whitehall building, New York City.

* * *

DR. FRANK J. WARNE, who for the past eight years has conducted a professional statistical department of his own in Washington, D. C., has been selected to fill the position of chief statistician for the Emergency Fleet corporation, serving under Vice Presi-

dent Coonley. The newly created statistical department, of which Dr. Warne is executive head, will have charge of assembling and disbursing between yards and corporation headquarters all information of a statistical nature. Dr. Warne is a graduate of the University of Pennsylvania.

* * *

ROBERT J. TOD has been made general manager of the branch office recently opened in New York, by the Intercontinental Navigation Corp., shipbroker, with main offices at Baltimore, Brazilian ports and Argentina.

* * *

JOHN L. ACKERSON, who will serve as assistant to Director General Charles M. Schwab of the Emergency Fleet corporation, has had several years of actual experience in naval construction work. He graduated from the Michigan Naval academy in 1901, and after two years at sea as a midshipman, was selected for the construction corps and was sent to Massachusetts Institute of Technology for a post graduate course in naval architecture. He later served for several years in the design branch of the bureau of construction and repair, and last August, was assigned to duty as aide to Admiral Capps, when he joined the Fleet corporation as general manager. When Admiral Capps resigned, Mr. Ackerson remained as aide to Mr. Piez. In his new position he is a commissioned officer on active duty. As a naval constructor he holds the rank of commander.

* * *

H. D. WRIGHT has succeeded the Colby Engineering Co. as Pacific coast representative of the Brown Hoisting Machinery Co., Cleveland. Mr. Wright formerly was manager of the San Francisco office of the Brown Hoisting company.

* * *

WILLIAM COXE has been elected a member of the board of directors of the Pennsylvania Shipbuilding Co., New Jersey Shipbuilding Co., and Pusey & Jones Co. Mr. Coxé was recently appointed supervisor of the privately owned shipyards along the Delaware river by Charles M. Schwab. Henry G. Barstairs, Baltimore, has been elected treasurer and director of the companies named.

25,000,000 Tons of Ships by 1920

United States to Have Greatest Fleet Ever Assembled,
Within Next Two Years—Estimates Cost at \$5,000,000,000

By Edward N. Hurley

IF the United States' code of honest and generous dealings is to be maintained in peace—and upon its maintenance will depend the future peace and security of the whole world—America must be in a position to maintain it. The vast merchant fleet we are building must become the greatest instrument of international probity, honesty and square-dealing at the close of the war. It must become the vast and vital machine whereby America will prevent the oppression of the weak by the strong; the crushing of right by might.

To make plain the causes of this war, and the cure of that alone will prevent a recurrence, it is necessary to make the contrast between Germany's present position and the position that she held previous to the war.

Into her three chief ports, Hamburg, Bremen, and Bremerhaven, there entered in 1913 a total of 16,546,000 net tons, and there cleared a total of 16,643,000 net tons. These figures include only overseas navigation. Germany's sea-borne imports from other countries into the two ports of Hamburg and Bremen in 1913 totalled \$1,454,933,000 and her sea-borne exports from those two ports in the same year aggregated \$1,028,696,000.

Germany's Plea Absurd

At that time the United States with its vast coast lines and its many ports exported only about \$2,500,000,000 of merchandise. The total United States imports and exports by sea in 1919 were \$3,373,000,000 and only \$381,000,000 or 10 per cent of those were carried in American vessels. Yet Germany's rulers, although having the fullest access to the sea, and with the oceans covered with German merchant ships, set up the plea in beginning the war that they were fighting for "the freedom of the seas." They are still making that absurd plea.

Their theory was that a speedy victory would enhance their prestige. But what is the result?

The Prussian military leaders, in their failure to see the truth, brought

about the very condition which they predicted would never arise. They brought about the isolation of the German Empire from the rest of the world.

No longer can there be any question that we will have the means, as well as the desire to safeguard the nations of the world from selfish intrigue and sordid manipulation of the world's

No Such Word as Truth in German Language

ONE of the chief benefits of the American educational system is that it teaches the need of character and truth. I have been told that there is no word in the German language which precisely corresponds to one of the words which means most in our life—the word "truth". German scholars have told me that the German word more correctly corresponds to our word "loyalty". Yet loyalty, without an appreciation of truth as an objective, may be misguided and morally ruinous. Well placed loyalty correctly may be regarded as one of the virtues; but loyalty to a false ideal or a corrupt national system must necessarily result in the demoralization of the nation as well as of the individual.

markets in the future. The great fleet we are building guarantees the achievement of this unselfish purpose. Inspired by the enthusiasm and energy of the greatest organizer America has produced—Charles M. Schwab—whose unmatched abilities and splendid services the government recently commandeered, and Charles Piez, vice president, who has spent six months developing an organization, our shipyards are getting their gait and setting a pace that would have seemed incredible in those very recent times when steamships required all the way from six months to two years to build.

In the launching of the 5500-ton collier TUCKAHOE from the Camden, N. J., yards of the New York Shipbuilding Co. in the record time of 27 days, from the date of keel laying, we have an illustration of what our American

ship workers are capable of when they get their stride.

On July 1, 1916, we had no merchant marine worthy of the name engaged in overseas trade. It is true that we had under the American flag a total deadweight tonnage on that date of 2,412,381 tons, but approximately 80 per cent of this tonnage was engaged in coastwise and Great Lakes trade. Therefore the vast supplies which we were sending abroad were shipped under terms and conditions laid down by other nations, because the great bulk of our exports was carried in ships flying foreign flags.

We were a great tourist nation, but Americans traveled in foreign ships. We had very few ships going to South or to Central America; very few going to England, France or Germany. We had still fewer going to Russia, Japan and China. There was just one line of old and comparatively slow ships crossing the Atlantic; one line crossing the Pacific and a few lines to Central America and to the Caribbean countries; none to the west coast of South America; none to the east coast of South America; none to our cousins in Australia; none to India; and none to Africa. There were American tourists everywhere. There were also American products ready to go anywhere, but American ships nowhere. We could not serve the world as we should have served it, because we did not have the vehicles of trade.

Increase Is Remarkable

Now we are beginning to fulfill our destiny. On June 1, this year, we had increased the American-built tonnage to over 3,500,000 deadweight tons of shipping. In the 11 months from July 1, 1917, to June 1, 1918, we constructed in American shipyards a tonnage equal to the total output of American yards during the entire previous four years. In short, the shipping board has added approximately 1,000,000 tons of new construction to American shipping in the last 10 months, for it was not until August 3 of last year that our commandeering order went into effect. We have also added 118 German and Austrian vessels, with a total deadweight tonnage of 730,176. We have

From an address by Edward N. Hurley, chairman of the shipping board, at the commencement exercise of the University of Notre Dame, South Bend, Ind., June 10.

requisitioned from the Dutch under the order of the President 86 vessels with a total deadweight tonnage of 526,532. In addition we have chartered from neutral countries 215 vessels with an aggregate deadweight tonnage of 953,661. This tonnage, together with the vessels which we have been obliged to leave in the coastwise and Great Lakes trade, gives us a total of more than 1400 ships with an approximate total deadweight tonnage of 7,000,000 tons now under the control of the United States shipping board.

4,500,000 Tons Added Since War

In round numbers, and from all sources, we have added to the American flag since our war against Germany began, nearly 4,500,000 tons of shipping. We are adding to this tonnage rapidly and will continue to do so. It has taken us some time to apply to the shipbuilding industry of this country the principles of organization and progressive manufacturing which have made our other big institutions the marvel of the world.

Since January of the present year, when our new quantity production of ships may well be said to have just begun, we have steadily risen in our monthly output until in May we turned out a total of 260,000 tons for that one month, making a total for the first five months of this year of 118 steel ships, aggregating 805,000 deadweight tons.

Now, in the year ending July 1, 1915, the shipyards in this country built 186,700 deadweight tons of steel vessels of over 1500 deadweight tons. Thus, in the month of May we produced 53,000 tons more than were produced in the entire year 1915. During the year ending July 1, 1916, 281,400 deadweight tons of steel vessels were delivered. Adding the 1915 tonnage with the 1916 tonnage gives a total of 468,100 tons. With a tonnage for the first five months of this year of 805,000 tons, we delivered in five months 336,900 tons of shipping more than was built in American shipyards in the years 1915 and 1916.

I do not believe I am overoptimistic in saying that our tonnage output will continue to increase until before this year closes we will be turning out a half million tons each month. We have established a shipbuilding industry that will make us a great maritime nation. We have today under contract and construction 819 shipbuilding ways, including wood, steel and concrete, which is twice as many shipbuilding ways as there are in all the rest of the ship-

yards throughout the entire world.

Our program for the future should appeal to the pride of all loyal and patriotic Americans. In the early part of May the members of the shipping board appeared before the appropriation committee of congress with a request for additional funds for our extended program. Our program calls for the building of 1856 passenger, cargo, refrigerator ships and tankers, ranging from 5000 to 12,000 tons each; with an aggregate deadweight tonnage of 13,000,000. We are also contracting for 200 wooden barges, 50 concrete barges, 100 concrete oil carrying barges and 150 steel, wood and concrete tugs of 1000 horsepower for ocean and harbor service, which aggregate a total deadweight tonnage of 850,000.

Exclusive of the above, we have 245 commandeered vessels, taken over from foreign and domestic owners, which are being completed by the Emergency Fleet corporation. These will average 7000 tons each and aggregate a total deadweight tonnage of 1,715,000.

* This makes a total of 2101 vessels exclusive of tugs and barges which are being built and will be put on the seas by the Emergency Fleet corporation in the course of carrying out the present program, with an aggregate deadweight tonnage of 14,715,000.

25,000,000 Tons in 1920

It will require \$5,000,000,000 to finish our program for 1918, 1919 and 1920, but the expenditure of this enormous sum will give to the American people the greatest merchant fleet ever assembled in the history of the world—a fleet which I predict will serve all humanity loyally and unselfishly upon the same principles of liberty and justice which brought about the establishment of this free republic. The expenditure of the enormous sum will give America a merchant fleet aggregating 25,000,000 tons of shipping.

American workmen have made the expansion of recent months possible and they will make possible the successful conclusion of the whole program. On July 1, 1917, there were in the United States not quite 45,000 men engaged in the shipbuilding yards. Today we have a force of 300,000 men in the yards, and 250,000 men engaged in allied trades. This force will be continuously increased. From all present expectations it is likely that by 1920 we shall have close to 1,000,000 men working on American merchant ships and their equipment.

The most liberal estimate of this

year's output of shipping from all countries, except America, does not exceed 4,000,000 tons. One of the ablest shipbuilders in the United States, Homer Ferguson, of Newport News, predicted before the senate committee in January that our tonnage for this year would be 3,000,000 in the United States alone. Mr. Powell, vice president of the Bethlehem Shipbuilding Corp., agreed with Mr. Ferguson. Mr. Schwab, director general of the Emergency Fleet corporation, has told me that he is going to prove that both of these good friends of his are somewhat conservative. He believes that the expert prediction of 3,000,000 tons can be exceeded, and I agree with him.

We have gradually reached the point where we have the facilities for constantly increasing our output. Of the 819 shipways in the United States, a total of 751, all of which except 90 are completed, are being utilized by the Emergency Fleet corporation for the building of American merchant ships.

U. S. Greatest Ship Operator

In 1919 the average tonnage of steel, wood and concrete ships continuously building on each way should be about 6000 tons. If we are using 751 ways on cargo ships, and can average three ships a year per way we should turn out in one year 13,518,000 tons, which is more than has been turned out by Great Britain in any five years of her history.

When all our wood, steel and concrete shipyards are thoroughly organized, with a keel laid on each of the 819 ways, our fabricating plants driving ahead at full speed, and employes more thoroughly trained in the art of ship construction, it is estimated that we can turn out from each way more than three ships a year.

The United States shipping board is not only the greatest shipbuilder in the world but is the greatest ship operator. In perfecting our organization we not only perfected that part of it which is building the ships but we have also another part which operates the ships.

The total gross revenue of our fleet is very impressive. From the ships under the control of the shipping board a total gross revenue is derived of about \$360,000,000 an amount more than the gross revenue of the New York Central railroad and almost equal to that of the Atchison, Topeka & Santa Fe railroad and the New York Central railroad combined.

American Ship Yard Activities

A Snappy Summary of the Leading Events of the Month in the
Vessel Construction Field

Two Big Pacific Shipyards Are Merged

BY R. C. HILL

BY far the most important transaction in shipbuilding property in the history of the North Pacific, was consummated during May when the Seattle Construction & Dry Dock Co. sold its shipbuilding plant to the government and in turn the yard was leased from the government by the Skinner & Eddy Corp. The change became effective June 1.

The magnitude of the deal was the sensation in Pacific coast circles of the month. The Todd interests, which owned the Seattle Construction & Dry Dock Co., have already begun work on a large ship repair plant in Seattle and have announced that the building yards at Tacoma, Wash., will be enlarged. The consolidation of its own plant with the leased plant will give the Skinner & Eddy Corp. 11 building ways and this company now has by far the largest building yard on the Pacific. The two yards adjoin each other and they will be turned into one immense plant.

There has been much speculation as to the reasons for the sale. However, it is known that it fits in with the plans of William H. Todd, who acquired the Seattle plant in July, 1916. It is reported in authentic circles that the government paid \$3,000,000 for the plant. Skinner & Eddy's lease runs for a term of years and with the plants merged and under one organization the output of ships will keep this immense plant prominently in the public eye.

Under the terms of the sale, the government bought the Seattle Construction & Dry Dock plant except the drydocks, machinery and repair tools. In other words, the owners retained the facilities for repair work and will at once establish a large repair yard, with increased docking facilities on Harbor island, a short distance from the present site.

In addition to their own five ways, Skinner & Eddy acquired six additional ways but it is understood that only 10 will be utilized as a matter of economical organization. The transfer includes all forward contracts but the Seattle Construction & Dry Dock Co. will complete some old contracts. The lease, it

is understood, gives the Skinner & Eddy Corp. the option of purchase. The combined plant covers 51 acres.

As soon as announcement was made of the change, it became known that

Destroyer Launched in Record Time

SHIPBUILDING history was made by patriotic employes when the destroyer WARD was launched June 2 at the Mare Island navy yard at Vallejo, Cal., just 16 days and 12 hours after the laying of her keel. The riveting was completed in 13 days, 10 hours.

The best previous record for the launching of a vessel of the size and type of the WARD was 65 days, and when that record was made several months ago many felt that the limit in speed had been reached.

The new record is all the more remarkable when it is considered that the almost unbelievable feat was accomplished with an average crew of 195 men working an average shift of only 10 hours since the keel was laid.

the Skinner & Eddy Corp. had received additional contracts for 50 steel ships for the Emergency Fleet. With the contracts now on hand and the additional 50, just awarded, it is expected that this merged plant will turn out at least 65 steel carriers between now and the end of 1919. This firm has started work on a 14,000-ton drydock which is to become an integral part of the combined plants.

Delays in the delivery of steel and the immense amount of repair work done by the Seattle Construction & Dry Dock Co. have retarded the progress of new construction. The result has been that construction work has bunched and soon after Skinner & Eddy takes over the plant, there will be several launchings in succession.

The Seattle Construction & Dry Dock

Co. has had a large number of repair jobs, including the rebuilding of the burned steamer CONGRESS, now the NANKING, which will soon be delivered to her new owners. A number of seized German ships were overhauled and rebuilt at this plant, which has also handled a great amount of ordinary repair work. It is known that the chance to sell the construction part of the plant fitted in with Mr. Todd's plans and now a great repair plant will be installed on Harbor island. The plant has just completed the 12,000-ton steel steamer WALTER A. LUCKENBACH, the largest steel ship ever built north of San Francisco.

At Tacoma, the Todd interests will concentrate construction work. Here the Todd plant already has increased its facilities from four to six ways and five more will be added in the near future, making it a healthy rival of the merged Skinner & Eddy plant in Seattle.

With the purchase of 15 acres on Harbor island, Seattle, as the site of its new plant, officials of the Seattle Construction & Dry Dock Co. announced that the 12,000-ton drydock, now at Tacoma, will be brought to Seattle. In addition the new Seattle plant will have the 12,000 and 3000-ton drydocks, now a part of the Seattle plant's equipment. Mr. Todd announced that if conditions warrant it, he will add a 23,000-ton drydock to the Seattle plant. Two large piers, extensive machine shops and repair shops are to be erected at once on the new site. The official name of the new plant has not yet been selected.

The passing of the Seattle Construction & Dry Dock Co. marks another epoch in the history of the oldest steel ship plant on the North Pacific. It was originally a machine shop operated by Moran Bros., who developed a great building and repair plant. Their crowning feat was the construction of the battleship NEBRASKA. Several years ago, Eastern capital bought the yard and with J. V. Paterson in charge it had a successful career. The Todd interests acquired title less than two years ago.

With the announcement that the Todd company is to establish a new repair yard in Seattle, John T. Heffernan, for years a prominent figure in ship repair work, startled Portland, Oreg., by the purchase of the 5000-ton drydock of the Oregon Dry Dock Co., which he will tow to Seattle as the nucleus of a new repair yard. Mr. Heffernan will establish his plant at West Seattle. He has extensive contracts for installing machinery in vessels building for the Emergency Fleet corporation.

Extensive improvements and additions are under way at the Winslow, Wash., plant recently leased by D. W. Hartzell, Inc. This yard has been so busy that

several repair jobs have been refused. The plant is being overhauled and additional equipment is being installed. The first government vessel, the wooden steamer ABRIGADA, is about ready to have machinery installed after undergoing considerable preliminary work at this yard.

Will Expand Shipyard

Alexander McDonald, shipbuilder, has purchased the site of the David Jones shipyard at Port Richmond, Staten Island, N. Y. The Jones yard is five times as large as the McDonald yard at Mariner Harbor, Staten Is-

land, and has a frontage of 269 feet and a depth of 460 feet on the Kill von Kull. The depth afforded for launching is 27 feet.

Mr. McDonald intends to build a marine railway capable of hauling vessels drawing 14 feet of water and up to 150 feet in length. A new pier 300 feet long is also under construction. Additional improvements consist of a mold loft, joiner shop and saw mill, 40 x 150 feet, two stories high; a 2-story paint and finishing shop, a pipe and coppersmith shop and a blacksmith shop. The building of vessels is expected to begin in July.

Designs Huge Ship for Lake Construction

LAKE shipyards are restricted in the sizes of ocean ships they can build by the Welland and St. Lawrence river canals. In an attempt to permit the construction of larger vessels than these canal-size ships, John L. Bogert, New York, has designed the vessel shown in the accompanying illustration.

This vessel is of approximately 10,500 tons deadweight capacity, 500 feet long over all, 480 feet long on the waterline and 72 feet beam. The design is unique as it provides for two separate hull sections joined, or fish-jointed, through the medium of sponsons placed at the sides. The designer points out that a ship of this type could be easily constructed on the lakes and brought to tidewater without difficulty before the sections were fastened together. The four separate compartments would reduce the torpedo menace to a minimum as at least three sections would have to be torpedoed before the vessel would become helpless. The designer claims that the fish jointing or overlapping

of the sponsons makes a much stronger ship than lake vessels which are cut in two and fastened together again after passing through the canals.

Mr. Bogert claims that there is no serious difficulty in so proportioning the entrances and runs, both of the main hull and the sponsons, that the residuary resistance of the complete ship at any given speed may be substantially the same as that of any well designed freighter of the same general dimensions. The designer wants a 20-foot model towed in a testing tank to determine the best shapes of entrances and runs so that the series of waves generated by the main hull and the sponsons may be neutralized.

The designer says that there is not the slightest reason to question the entire practicability of such an arrangement, and he points to the fact that towboats often get better results when lashed amidships of two tows than when steaming with a long towing hawser.

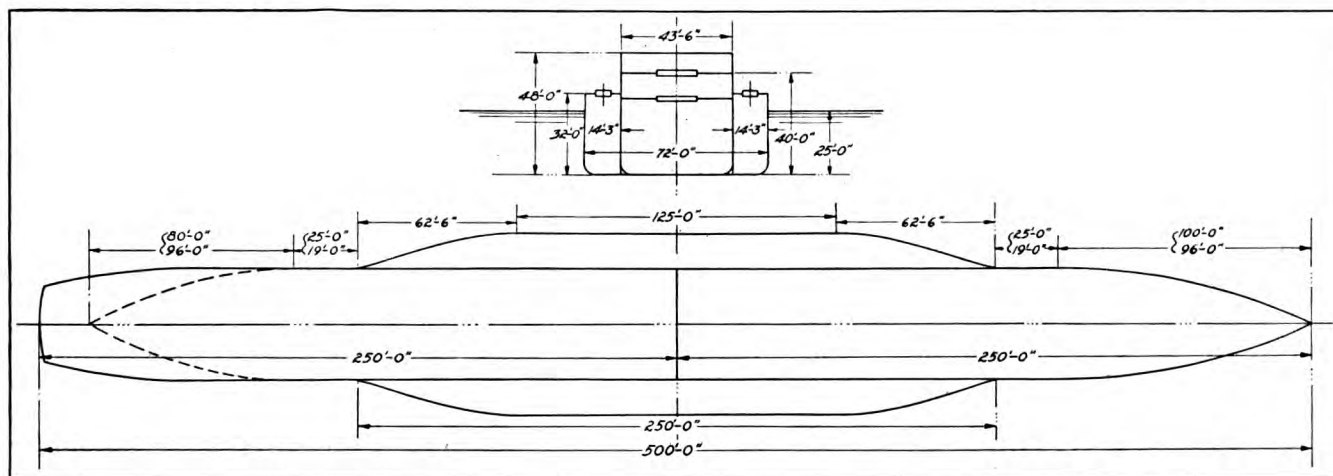
The Maritime Engineering Corp. has

been organized in New York with an authorized capital of \$1,250,000 to construct steel vessels on Goat island, Pasquotank river, Elizabeth City, N. C. Russell B. Smith, New York, is the president. The shipyard site has been leased and preparations have begun on the construction of buildings, ways, shops and other necessary facilities.

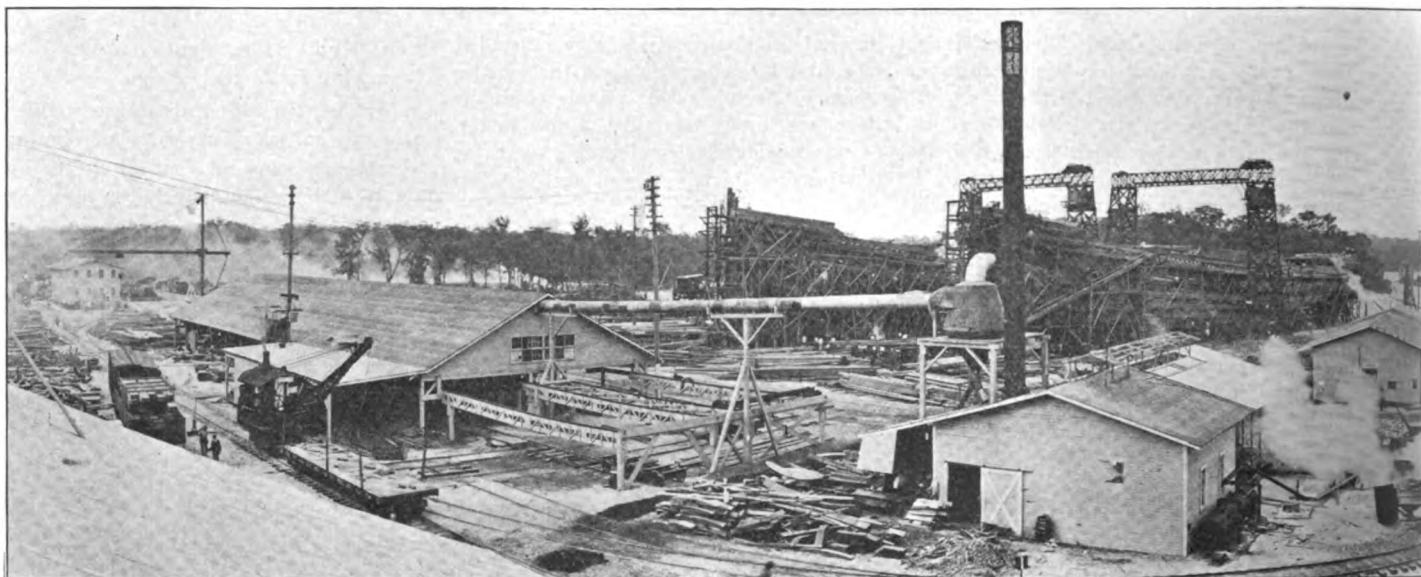
The New York Shipbuilding Corp. recently completed 10 wooden ways at its Gloucester City, N. J., plant and has seven ships under construction there. These are temporary ways for ships that are to be turned out in a hurry.

David J. Conroy, Inc., New York, has been incorporated in Delaware with a capital of \$100,000 to operate a boat-building plant.

E. K. Irwin, Spokane, Wash., has organized the West Coast Shipbuilding Co., with a capital of \$1,000,000. Announced plans call for an investment of \$350,000 in erecting a concrete shipbuilding plant at Everett, Wash.



VESSEL OF 10,500 TONS DEADWEIGHT CAPACITY MADE UP OF FOUR SECTIONS WHICH CAN BE READILY CONSTRUCTED ON THE GREAT LAKES AND ASSEMBLED AT TIDEWATER



YARD OF BEAUMONT SHIPBUILDING & DRY DOCK CO., BEAUMONT, TEX., WHERE FIRST FERRIS

Rush Work at New Orleans

WORK is well under way on the shipyard being established on the line of the New Orleans industrial canal by Doullut & Williams, ship contractors of the Crescent City, who have obtained contracts from the Emergency Fleet corporation for constructing eight 9600-ton steel cargo steamships, at a total cost of \$15,000,000. The first launching is scheduled for October of this year and work on the yard was begun June 1, so that speed of construction is the main essential in the new plant.

The site selected is near the Lake Pontchartrain end of the industrial canal, and a dredge has begun work on that end, while two others are at work on the main ditch, having eaten their way in from Bayou Bienvenue, which is to be one of the laterals of the main canal.

This is the largest shipbuilding contract ever placed in the south, both as to money involved and as to number of ships to be constructed. The plant will be the largest in the entire south. The vessels involved are to be the largest for which contracts have been awarded on the gulf coast, the next in size being WAR MYSTERY, WAR MARVEL and CITY OF BONHAM, wooden steamers recently built and launched by the National Shipbuilding Co., Orange, Tex. These were of 4700 tons. Four shipways are to be built, according to Capt. M. P. Doullut, who is in active charge of the work. Two of these must be ready within 60 days from June 1. As this plant is being built, the canal and the launching basin will be dredged, while as soon as the first shipway is completed a

vessel will be commenced irrespective of whether the canal or the basin is completed by that time. Four months after the first way is completed, the contracts call for the launching of the first ship. This means that the first way must be ready to receive the first keel not later than July 1. The first launching must take place in October, the second in December and thereafter one ship a month will be sent into the water, according to Captain Doullut.

Doullut & Williams have been engaged in civil engineering and general and marine contracting in New Orleans for the past 15 years, specializing in river and harbor work and the construction of foundations, especially under water.

The firm consists of Capt. M. P. Doullut, his son, Paul Doullut, and W. Horace Williams, former president of the Louisiana Engineering society. On April 25, this firm organized the Doullut & Williams Shipbuilding Co., Inc., with a capital of \$1,000,000. Captain Doullut is president, Paul Doullut vice president, and Mr. Williams secretary-treasurer and general manager. L. H. Guerin, chief engineer, will have charge of the details of construction. James P. Ewen will be assistant to Mr. Guerin.

The steel ships to be built will be 400 feet long by 55 feet beam and each will draw 27 feet of water, loaded. The engines of each will develop 3000 horsepower, planned to give a minimum speed of 12 knots to the loaded ship. Full complement of men for work in the yard is placed at 2500. All machinery will be installed and vessels completely equipped at

First Wood Ship Built in Texas for Emergency

TO THE yard of the Beaumont Shipbuilding & Drydock Co., Beaumont, Tex., C. O. Yoakum, general manager of the yard and vice president of the firm, goes the honor of launching the first wooden ship (Ferris type) built in Texas for the Emergency Fleet corporation. The launching was at night, Saturday, May 11, and the big boat slid into the water without mishap, Mrs. William Pettus Hobby, wife of the lieutenant governor of Texas, acting as sponsor. Peculiar interest attached to Mrs. Hobby's appearance in the launching, inasmuch as her father, S. B. Cooper, for 16 years represented the Beaumont district in congress, and gave John Henry Kirby, one of the owners of the Beaumont shipyard and now busy keeping all southern yards supplied with material for ships, his start in life by having him appointed a page in the Texas senate.

C. O. Yoakum was in charge of the launching, and as the ship dropped down the ways she left behind her the frames of five others of similar type and size, which will be launched soon. The ways she vacated have been filled with another keel, so that the Beaumont company is now at work on six Ferris-type ships. In addition, an 8000-ton drydock and a 3200-ton marine railway are being built.

New Orleans, and they will leave Lake Pontchartrain under their own steam, the first time such a thing has occurred in that section of the country. The eight ships will call for the transportation of 26,000 tons of steel to New Orleans, much of which, it is expected, will come by water from the Alabama mills.

At the other end of the industrial canal, on the river side of New Orleans, at the plant of the Foundation



TYPE OF WOODEN SHIP BUILT IN TEXAS FOR THE SHIPPING BOARD HAS JUST BEEN LAUNCHED

Fleet Corporation is Launched at Beaumont

IN THE accompanying photograph, the boat launched May 11 is seen on the ways immediately behind the smoke-stack; the piledriver in the distance marks the location of the drydocks, and the marine railway will be at the right of the photo. The company has contracts for the equipment of 34 ships.

The boat just launched is 281 feet long by 45 feet wide, with a depth of 26 feet, and a cargo-carrying capacity of 3500 tons, somewhat smaller than WAR MYSTERY, the 4700-ton Dougherty-type wooden vessel, launched by the National Shipbuilding Co., Orange, Tex., a few weeks ago, yet sufficiently large to meet all the requirements of the Emergency Fleet corporation. The power plant consists of double compound condensing engines for which steam is furnished by two Scotch boilers, giving her an estimated speed of 10 knots an hour. At this writing the vessel has not been named.

The frame of the boat was laid in November, 1917, and 1,600,000 feet of Texas and Louisiana pine, oak and cypress was used in her construction. The largest timber in her is 52 feet long by 42 inches in thickness. Her four masts are intended to give her sufficient sail space to materially increase the estimated 10-knot speed when favoring winds appear.

Co., New York, the levee around the launching basin has been virtually completed. Here nine "nonsinkable" ships of 4200 tons each are to be built for the French government.

The Gulf Shipbuilding Co., which recently launched HERMANSON, a 900-ton ocean-going tug, largest of its kind ever built in the South, from its yards at Madisonville, is working on a 500-ton river towboat and a 900-ton auxiliary schooner.

Frisco to Build 92 Ships

CONTRACTS for 92 steel vessels, aggregating more than a million tons and costing more than \$160,000,000, is the measure of the shipbuilding activity about San Francisco bay at the present time, according to the statements of officials of the Emergency Fleet corporation. A definite promise has been made that every one of these cargo carriers—spans in the bridge to France—will be in the water by the end of the year.

These totals are exclusive of construction under way or to be undertaken for the navy department. The vessels are divided among the following concerns:

Company	No. of vessels
Union Iron Works, Alameda plant.....	18
Moore Shipbuilding Co.....	28
Hanlon Shipbuilding Co.....	8
Pacific Coast Shipbuilding Co.....	10
Union Construction Co.....	10
Schaw-Batcher Ship Works Co.....	18

The six plants, employing 20,000 men, now have 28 steel cargo steamers on the ways, of which 14 of from 8500 to 9600 tons burden, will be launched within the next six weeks. The arrival at San Francisco of approximately 65 carloads of steel daily for the fabrication of the vessels gives some idea of the rapidity with which the work is going forward.

The patriotic celebration on July 4 will be marked by the launching of 18 vessels into San Francisco bay from five yards. They are: Union Iron Works, Moore Shipbuilding Co., Hanlon Shipbuilding Co., Pacific Shipyard and the Pacific Coast Shipbuilding Co.'s plant. Several of these are naval craft.

The Union plant of the Bethlehem Shipbuilding Corp. is fourth among the yards of the country engaged in the

construction of destroyers listed in order of their proficiency. According to information recently given out by the San Francisco offices of the corporation, the proportion of actual accomplishment to expectancy is as follows:

Company	Per cent
Bath Iron Works.....	152
Newport News Shipbuilding & Dry Dock Co.	141
Wm. Cramp & Son Ship & Engine Building Co.	117
Bethlehem Shipbuilding Corp. (Union)	104
Bethlehem Shipbuilding Corp. (Fore River)	79
Bethlehem Shipbuilding Corp. (Squantum)	53
New York Shipbuilding Corp.....	49
Seattle Construction & Drydock Co....	26

There is a wager of \$20,000 between the employes of the Union and Fore River plants of the Bethlehem Shipbuilding Corp. on the rapidity with which destroyers are turned out during the year. The Union plant is confining its efforts to the construction of vessels for the navy department, as is the Mare Island navy yard at Vallejo, Cal., where a destroyer was recently launched within 16 days, 12 hours after the laying of the keel.

Although the amount of wooden shipbuilding around San Francisco is not as large as at many other points, nevertheless three plants are now engaged in this class of work, and this, together with the concrete construction which will soon be under way, considerably augments the total tonnage to be turned out in steel alone. The Barnes-Tibbets Co. at Alameda, Cal., is now starting wooden ship construction and is also fitting out hulls constructed in the northern part of the state. Several of these have been towed to San Francisco loaded with lumber.

After considerable delay, it is expected that the site for the government con-

COMPARISON OF DIVISIONS ON BASIS OF TOTAL CONSTRUCTION IN EQUIVALENT DWT DURING MARCH 1918 ON ALL STEEL SHIPS IN COURSE OF ERECTION FOR THE U. S. SHIPPING BOARD - EMERGENCY FLEET CORP.			
DIVISION	DISTRICTS INCLUDED	COMPARISON OF TONNAGE ERECTED	
PACIFIC	NO. 7 & 8		
N. ATLANTIC	NO. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10		
GREAT LAKES	NO. 2		
S. ATLANTIC	NO. 3, 4, 5		

COMPARISON OF DISTRICTS ON BASIS OF TOTAL CONSTRUCTION IN EQUIVALENT DWT DURING MARCH 1918 ON ALL STEEL SHIPS IN COURSE OF ERECTION			
DISTRICT	STATES INCLUDED	COMPARISON OF TONNAGE ERECTED	
5	WASH. & OREGON		
7	CALIFORNIA		
8	GREAT LAKES SECTION		
9	MD., VA., & DEL.		
10	CHIL., S. JERSEY, VIRGINIA		
11	CHIL., S. JERSEY, VIRGINIA		
12	CHIL., S. JERSEY, VIRGINIA		
13	CHIL., S. JERSEY, VIRGINIA		
14	CHIL., S. JERSEY, VIRGINIA		
15	CHIL., S. JERSEY, VIRGINIA		
16	CHIL., S. JERSEY, VIRGINIA		
17	CHIL., S. JERSEY, VIRGINIA		
18	CHIL., S. JERSEY, VIRGINIA		
19	CHIL., S. JERSEY, VIRGINIA		
20	CHIL., S. JERSEY, VIRGINIA		
21	CHIL., S. JERSEY, VIRGINIA		
22	CHIL., S. JERSEY, VIRGINIA		
23	CHIL., S. JERSEY, VIRGINIA		
24	CHIL., S. JERSEY, VIRGINIA		
25	CHIL., S. JERSEY, VIRGINIA		
26	CHIL., S. JERSEY, VIRGINIA		
27	CHIL., S. JERSEY, VIRGINIA		
28	CHIL., S. JERSEY, VIRGINIA		
29	CHIL., S. JERSEY, VIRGINIA		
30	CHIL., S. JERSEY, VIRGINIA		
31	CHIL., S. JERSEY, VIRGINIA		
32	CHIL., S. JERSEY, VIRGINIA		
33	CHIL., S. JERSEY, VIRGINIA		
34	CHIL., S. JERSEY, VIRGINIA		
35	CHIL., S. JERSEY, VIRGINIA		
36	CHIL., S. JERSEY, VIRGINIA		
37	CHIL., S. JERSEY, VIRGINIA		
38	CHIL., S. JERSEY, VIRGINIA		
39	CHIL., S. JERSEY, VIRGINIA		
40	CHIL., S. JERSEY, VIRGINIA		
41	CHIL., S. JERSEY, VIRGINIA		
42	CHIL., S. JERSEY, VIRGINIA		
43	CHIL., S. JERSEY, VIRGINIA		
44	CHIL., S. JERSEY, VIRGINIA		
45	CHIL., S. JERSEY, VIRGINIA		
46	CHIL., S. JERSEY, VIRGINIA		
47	CHIL., S. JERSEY, VIRGINIA		
48	CHIL., S. JERSEY, VIRGINIA		
49	CHIL., S. JERSEY, VIRGINIA		
50	CHIL., S. JERSEY, VIRGINIA		
51	CHIL., S. JERSEY, VIRGINIA		
52	CHIL., S. JERSEY, VIRGINIA		
53	CHIL., S. JERSEY, VIRGINIA		
54	CHIL., S. JERSEY, VIRGINIA		
55	CHIL., S. JERSEY, VIRGINIA		
56	CHIL., S. JERSEY, VIRGINIA		
57	CHIL., S. JERSEY, VIRGINIA		
58	CHIL., S. JERSEY, VIRGINIA		
59	CHIL., S. JERSEY, VIRGINIA		
60	CHIL., S. JERSEY, VIRGINIA		
61	CHIL., S. JERSEY, VIRGINIA		
62	CHIL., S. JERSEY, VIRGINIA		
63	CHIL., S. JERSEY, VIRGINIA		
64	CHIL., S. JERSEY, VIRGINIA		
65	CHIL., S. JERSEY, VIRGINIA		
66	CHIL., S. JERSEY, VIRGINIA		
67	CHIL., S. JERSEY, VIRGINIA		
68	CHIL., S. JERSEY, VIRGINIA		
69	CHIL., S. JERSEY, VIRGINIA		
70	CHIL., S. JERSEY, VIRGINIA		
71	CHIL., S. JERSEY, VIRGINIA		
72	CHIL., S. JERSEY, VIRGINIA		
73	CHIL., S. JERSEY, VIRGINIA		
74	CHIL., S. JERSEY, VIRGINIA		
75	CHIL., S. JERSEY, VIRGINIA		
76	CHIL., S. JERSEY, VIRGINIA		
77	CHIL., S. JERSEY, VIRGINIA		
78	CHIL., S. JERSEY, VIRGINIA		
79	CHIL., S. JERSEY, VIRGINIA		
80	CHIL., S. JERSEY, VIRGINIA		
81	CHIL., S. JERSEY, VIRGINIA		
82	CHIL., S. JERSEY, VIRGINIA		
83	CHIL., S. JERSEY, VIRGINIA		
84	CHIL., S. JERSEY, VIRGINIA		
85	CHIL., S. JERSEY, VIRGINIA		
86	CHIL., S. JERSEY, VIRGINIA		
87	CHIL., S. JERSEY, VIRGINIA		
88	CHIL., S. JERSEY, VIRGINIA		
89	CHIL., S. JERSEY, VIRGINIA		
90	CHIL., S. JERSEY, VIRGINIA		
91	CHIL., S. JERSEY, VIRGINIA		
92	CHIL., S. JERSEY, VIRGINIA		
93	CHIL., S. JERSEY, VIRGINIA		
94	CHIL., S. JERSEY, VIRGINIA		
95	CHIL., S. JERSEY, VIRGINIA		
96	CHIL., S. JERSEY, VIRGINIA		
97	CHIL., S. JERSEY, VIRGINIA		
98	CHIL., S. JERSEY, VIRGINIA		
99	CHIL., S. JERSEY, VIRGINIA		
100	CHIL., S. JERSEY, VIRGINIA		

CHART 1

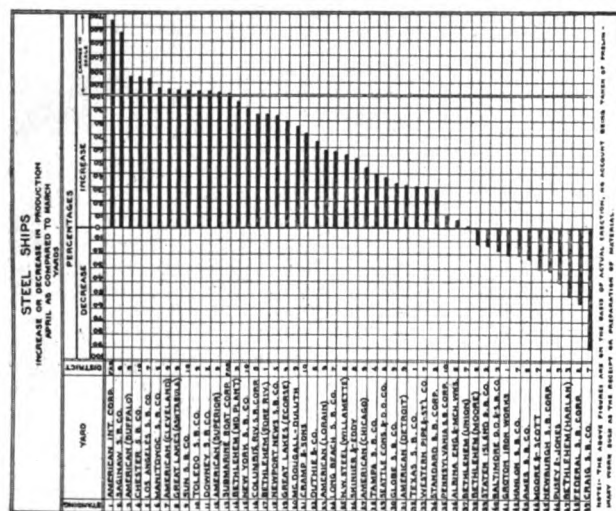


CHART 2

STEEL SHIPS INCREASE OR DECREASE IN PRODUCTION APRIL AS COMPARED TO MARCH SECTIONS OF COUNTRY			
DIVISION	DISTRICTS INCLUDED	PERCENTAGES INCREASE OR DECREASE IN PRODUCTION APRIL AS COMPARED TO MARCH	
FABRICATING			
GREAT LAKES	NO. 1 & 2		
NO. ATLANTIC	NO. 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100		
NO. ATLANTIC	NO. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100		
NO. ATLANTIC	NO. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100		

CHART 4

COMPARISON OF YARDS ON BASIS OF TOTAL CONSTRUCTION ON ALL SHIPS IN COURSE OF ERECTION FOR U. S. SHIPPING BOARD - EMERGENCY FLEET CORP.			
YARD	STEEL SHIP	DISTRICT	COMPARISON OF TONNAGE ERECTED
1	WINNER & EDDY	1	
2	WHEELER & CORP.	2	
3	MOORE & SCOTT IRON WORKS	3	
4	SEATTLE CONST. & D. CO.	4	
5	NEW YORK S. S. CO.	5	
6	FEDERAL S. S. CO.	6	
7	COLUMBIA RIVER S. S. CO.	7	
8	AMES S. S. CO.	8	
9	WHEELER & CORP.	9	
10	H. W. STEEL CO. (WILLAMETTE)	10	
11	DUTHIE & CO.	11	
12	WHEELER & CORP.	12	
13	WHEELER & CORP.	13	
14	AMERICAN S. S. CO. (OREGON)	14	
15	AMERICAN S. S. CO. (OREGON)	15	
16	PENNSYLVANIA S. S. CO.	16	
17	GREAT LAKES (ECONOMY)	17	
18	STANDARD S. S. CO.	18	
19	SUN S. S. CO.	19	
20	WESTERN PIPE & STEEL CO.	20	
21	WHEELER & CORP.	21	
22	CHRYSLER S. S. CO.	22	
23	CHRYSLER S. S. CO.	23	
24	MANITOWOC S. S. CO.	24	
25	AMERICAN S. S. CO. (CHICAGO)	25	
26	TEXAS S. S. CO.	26	
27	LOS ANGELES S. S. CO.	27	
28	HANSON D. D. S. S. CO.	28	
29	ALBION S. S. CO.	29	
30	FRANK W. S. S. CO.	30	
31	NEWPORT NEWS D. D. S. S. CO.	31	
32	TOLEDO S. S. CO.	32	
33	STATEN ISLAND S. S. CO.	33	
34	WHEELER & CORP.	34	
35	LONG BEACH S. S. CO.	35	
36	DOWNEY S. S. CO.	36	
37	AMERICAN S. S. CO. (CLEVELAND)	37	
38	AMERICAN S. S. CO. (SUPERIOR)	38	
39	GREAT LAKES (ASTORIA)	39	
40	MC DONOUGH & DULUTH	40	
41	GLOBE S. S. CO.	41	
42	FRANK S. S. CO.	42	
43	TAMPA S. S. CO.	43	
44	NEWBURN SHIPYARD INC.	44	
45	DETROIT IRON WORKS	45	
46	AMERICAN S. S. CO. (BUFFALO)	46	
47	BRIDGEWATER S. S. CO.	47	

CHART 3

WOOD SHIPS LAUNCHED IN SHORTEST TIME FROM DATE OF STEEL LAYING			
YARD	SHIP	TYPE	NUMBER OF DAYS
1	MARKET STREET-PORTER	11	11
2	MARKET STREET-PORTER	11	11
3	MARKET STREET-PORTER	11	11
4	MARKET STREET-PORTER	11	11
5	MARKET STREET-PORTER	11	11
6	MARKET STREET-PORTER	11	11
7	MARKET STREET-PORTER	11	11
8	MARKET STREET-PORTER	11	11
9	MARKET STREET-PORTER	11	11
10	MARKET STREET-PORTER	11	11

CHART 5

SHIPPING BOARD officials continue to release records of actual performance in ship construction by the various yards and districts and a stimulating spirit of rivalry has been aroused.

Charts 1 and 3 give comparisons of total construction in deadweight tons during March on all steel ships being erected. No account is taken of difference in sizes of yards, of preliminary work or of the fabricating plants.

Charts 2 and 4 show the increase or decrease in production in April compared to March.

Chart 5 shows the best records in quick construction of wooden ships.

crete ship construction plant will soon be designated and there is little doubt that it will be located in the Oakland estuary since the city of Oakland has cleared the title through the relinquishment of all claims. Eight 7500-ton ships are to be built at this plant upon each of which the San Francisco Shipbuilding Co., builders of the first large concrete vessel in this country, the FAITH, will receive an engineering or superintending constructor's fee of \$30,000.

The six plants engaged in steel construction are now in a position to launch an average of two 8800-ton vessels each

week, it is said, and it is expected that this average will be increased before the end of the year. The first phase of the development of the shipbuilding industry in this district that of preparation has been passed.

Payroll is Large

More than \$15,000,000 a month is being spent at San Francisco on shipbuilding and about 14 per cent of the total steel ship construction in the United States is being handled in California, according to Capt. A. F. Pillsbury of the Emergency Fleet corporation. The 92 vessels being built in the

San Francisco bay district are said to represent about one-sixth of the 1918 program of the country. In all 200 ships have been allotted to California for construction out of a total of 1900.

A recent innovation was the establishment of a camouflage department at San Francisco and the OAKLAND, built for transport service, was the first vessel to receive the deceitful and grotesque adornment. Previously, vessels intended for Atlantic war zone service have been sent to Atlantic ports for camouflaging, involving considerable delay in the transportation of cargoes destined overseas.

Rare Woods Used in Shipbuilding--IV

By C. D. Mell

THE most gigantic timber tree in tropical America is the mora, *Dimorphandra mora*, which finds its best development in British Guiana. There is not one of the North American

it develops enormous buttresses which are sometimes more than 20 feet through.

It is difficult to form an idea of the mora forests. Unlike other South

American trees this species often occurs in pure stands, and the growth of mora trees in some places is so dense that it is impossible to see the sky above them. The vision is lost in a mass of leaves and dense shadows. A noted

The wood varies from chestnut-brown to dark-red or red. It is hard, heavy, strong and tough and generally has a twist or waviness in the fiber, which imparts to the polished boards cut from the logs a beautifully figured appearance, giving to them much additional value for special uses. As it takes a good polish, it is sometimes utilized as a substitute for rosewood or for the darker grades of true mahogany in cabinet making and is employed extensively for many purposes in the wood working arts.

One of the most valuable properties of mora is its nonliability to splinter. It rivals oak in this respect; in fact it is one of the toughest woods known. Its outstanding merits are remarkable



CLOSE-UP VIEW OF TWO MORA TREES SHOWING BUTTRESSES

hardwood forest trees that can be compared with it. Our large oaks would only seem like dwarfs if they were standing near one of these giants, the stems of which are overshadowed by beautiful dark-green foliage. The Indians call this tree the "chief of the forest" which appears to be an appropriate name. It often attains a height of 150 feet and a diameter of 8 or 10 feet above the root swelling. One marked feature about this tree is that

naturalist once said that the observer can behold in these forests only a labyrinth of trees of enormous proportions, and that the dome of dense foliage darkens the atmosphere and renders it intolerable, heavy, and gloomy. Vines of great thickness entwine the trunks and grow to the highest treetops where they form an intricate woven network.



WHERE SHIP TIMBERS GROW—MORA FOREST IN BRITISH GUIANA

durability, a particularly high breaking strain, exceptional strength, an average specific gravity of about 0.915 (approximately 57 pounds per cubic foot), and a practically unlimited power of resisting the action of water. Mora contains an

oily or glutinous substance in its pores which is probably conducive to its durability.

Mora has won for itself, by its exceptionally fine qualities, special distinction in many building circles, notably in the sphere of naval and marine construction work. It is used largely for various engineering and constructional purposes in harbor works, railway trestles, bridges, buildings, etc. It has proved a most suitable wood for the manufacture of railway carriages, wagon work and heavy construction generally. This wood is used also locally for inside joiner's work and for furniture, and cabinet work. Its chief use in England has been for beams, keelsons, engine bearers and planking in ship-building.

A tree with a sound trunk will furnish logs of from 30 to 40 or even 50 feet in length, and from 20 to 40 inches square. These logs supply choice and valuable pieces for naval architecture, such as keels, stern posts, floors, ribs, beams, knees, breasts, backs, etc. Its crooked timbers are often utilized for knees. The importance of mora wood for naval construction cannot be overestimated. It is considered by competent judges of wood to be superior to oak as it is not subject to decay. Mora is classified by Lloyd's as a first-class shipbuilding wood ranking with oak, greenheart and mahogany.

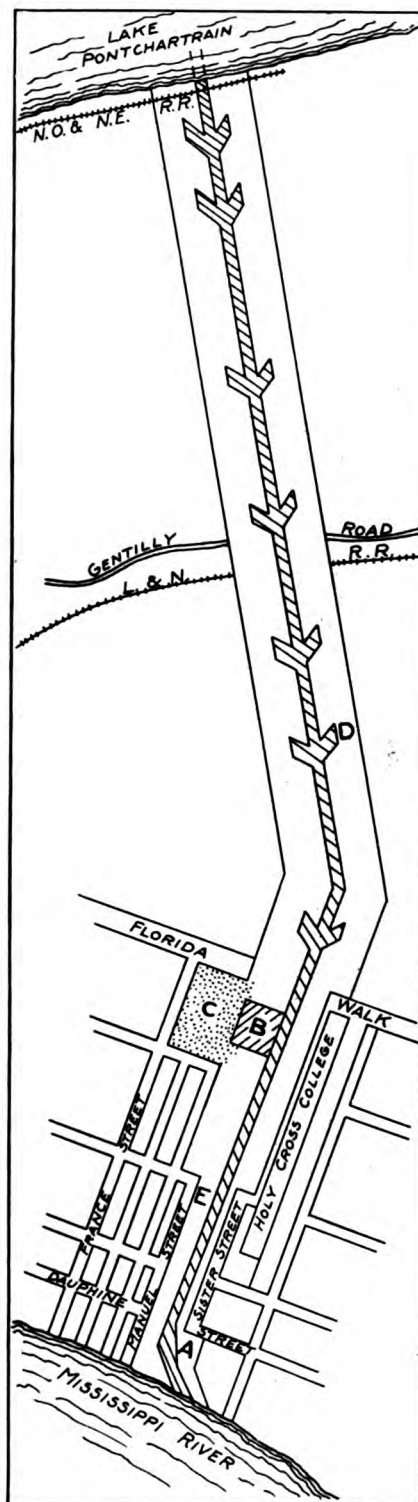
Beaumont Leads South in Ship Launchings

With four ships launched for the federal government in May, and with plans so arranged that one ship a month will be launched from someone of the four yards there, Beaumont, Tex., at end of May, took the lead in shipping in the south.

The Beaumont Shipbuilding & Drydock Co. launched its first ship early in May, while its second was reported off the ways about three weeks later. The Lone Star Shipbuilding Co. and McBride & Law also put a hull each into the water. While Mrs. Woodrow Wilson had previously named all the ships of the Emergency Fleet corporation, she kindly waived this prerogative, so that the first ship launched by McBride & Law, could be named BEAUMONT. This vessel is officially known in Washington as No. 169. QUAPAW is now under construction in the McBride & Law yards and keels have been laid for SNOGALME and GOLIAD in the same plant. The Lone Star Co.'s first boat was named HOSSAC, and two others are under construction in the same yard.

NACOGDOCHES, the first boat completed in the sixth district for the government, and which was launched at Houston,

Tex., April 5, has been towed to Beaumont, where her machinery and fittings are being installed. She will go out under her own steam before the end of June. All the dredging for the 3200-foot marine railway being constructed for the Beaumont Shipbuilding & Drydock Co. has been completed and work begun on the 8000-ton drydock.



BOUNDARIES OF NEW ORLEANS CANAL AS FINALLY FIXED, SHOWING TURNING BASIN AND SITE OF THE SHIPBUILDING PLANT OF THE FOUNDATION CO., NEW YORK

North Pacific Launches 27 Ships in May

The North Pacific launching record for May, including only Washington, Oregon and British Columbia yards, includes 27 vessels, 19 of wood and 8 of steel. During the months steady progress has been made in the output of tonnage. While labor troubles have appeared in British Columbia, the situation in Washington and Oregon has been entirely satisfactory. During May several new yards made their first contributions. These plants include the Wright and Foundation yards at Tacoma, and Meacham & Babcock, Seattle, who are working on government contracts. The Foundation yard at Tacoma launched two wooden vessels for French interests during May.

Two 7500-ton steel vessels were launched during the last week of the month by the Seattle Construction & Dry Dock Co., the VITTORIO EMMANUELE III, commandeered by the government, and the WILLIMANTIC, this firm's first direct contract launching, and the yard's 105th ship. Skinner & Eddy continued their record of two launchings a month with the 8,800-ton WEST ALSEK and WEST APAUM. The Grays Harbor Shipbuilding Co., engaged exclusively now on government work, launched two 4000-ton wooden steamers for the shipping board.

With the launching of the WEST APAUM, the Skinner & Eddy Corp., sent into the water its eighth direct contract ship. The WEST APAUM was launched in 56 working days, or within one day of the record made with the WEST LIANGA, which was sent down the ways in 55 working days and turned over complete to the government in 67 working days. This yard has now launched three 8800-ton ships in 60 days or less. Following is the North Pacific's launching record for May:

- May 23—SAMUEL H. HEDGES, 3000-ton auxiliary wooden schooner, by Puget Sound Bridge & Dredging Co., Seattle.
- May 8—CHERON, 3500-ton wooden steamer, by Seaborn Shipyards, Tacoma, Wash.
- May 24—VITTORIO EMMANUELE III, 7500-ton steel steamer, by Seattle Construction & Dry Dock Co., Seattle.
- May 11—WEST ALSEK, 8800-ton steel steamer, by Skinner & Eddy Corp., Seattle.
- May 23—WEST APAUM, 8800-ton steel steamer, by Skinner & Eddy Corp., Seattle.
- May 25—WESTERN SEA, 8800-ton steel steamer, by J. F. Duthie & Co., Seattle.
- May 20—BUNDARRA, 4200-ton wooden steamer, by Patterson-McDonald Co., Seattle.
- May 18—BOULTON, 3500-ton wooden steamer, by Meacham & Babcock Co., Seattle.
- May 23—MASUDA, 7500-ton steel steamer, by Todd Dry Dock & Construction Co., Tacoma, Wash.
- May 1—YAKIMA, 3500-ton wooden steamer, by Wright Shipyards, Tacoma, Wash.

May 22—NOYON, 3000-ton auxiliary schooner, by Foundation Co., Tacoma, Wash.
 May 16—BELOIT, 3500-ton wooden steamer, by Tacoma Shipbuilding Co., Tacoma, Wash.
 May 11—LIEUTENANT GRANIER, wooden auxiliary schooner, by Foundation Co., Portland, Oreg.
 May 27—CAPTAIN DE BEAUCHAMP, wooden auxiliary schooner, by Foundation Co., Portland, Oreg.
 May 11—POINT ADAMS, 3300-ton wooden steamer, by Albina Engine & Machine Works, Portland, Oreg.
 May 2—CRESAP, 4000-ton wooden steamer, by Peninsula Shipbuilding Co., Portland, Oreg.

May 12—BOSLEY, 3500-ton wooden steamer, by Grant-Smith Porter Shipbuilding Co., Portland, Oreg.
 May 25—WANKAN, 3500-ton wooden steamer, by Grant-Smith Porter Shipbuilding Co., Portland, Oreg.
 May 6—WESTERN SPIRIT, 8800-ton steel steamer, by Northwest Steel Co., Portland, Oreg.
 May 27—WESTERN LIGHT, 8800-ton steel steamer, by Northwest Steel Co., Portland, Oreg.
 May 8—ISSAQUENA, 3500-ton wooden steamer, by St. Helens Shipbuilding Co., St. Helens, Oreg.
 May 4—KASKASKIA, 4000-ton wooden steamer, by Grays Harbor Shipbuilding Co., Aberdeen, Wash.

May 15—BLACKFORD, 4000-ton wooden steamer, by Grays Harbor Shipbuilding Co., Aberdeen, Wash.
 May 18—SAN DIEGO, 2000-ton wooden steamer, by Matthews Shipbuilding Co., Aberdeen, Wash.
 May 23—WAR TATLA, 2800-ton wooden steamer, by Polar Island Shipbuilding Co., New Westminster, B. C.
 May 29—WILLIMANTIC, 7500-ton steel steamer by Seattle Construction & Dry Dock Co., Seattle. (First direct contract ship for U. S. shipping board.)
 May 1—GERBERVILLE, 3000-ton wooden auxiliary ship by Foundation, Tacoma, Wash.

Latest News from American Shipyards

PRESIDENT WILSON on May 30 drove a rivet in the keel of the steamer GUNSTON HALL, under construction in a new Virginia yard. The boat is a 9400-ton freighter. Mrs. Wilson guided the last vertical plate into position, naming the ship at the same time. The shipyard is located at Alexandria, Va., and is owned by the Virginia Shipbuilding Co., in which Charles W. Morse, New York, represents the controlling interest. The yard was made ready for starting ship construction in 85 working days, the site three months ago being a swamp. Since ceded by James II to the "Associated Adventurers of the City of London," the land has never been used. Approximately 78 per cent of the construction work has been underground, concrete piles being sunk on which to build the shops and ways. The GUNSTON HALL is to be delivered before Oct. 1, eleven other ships being scheduled for delivery by Feb. 15, 1919, from the company's four ways.

The Sawyer-Reid Co., Everett, Wash., organized a few months ago, is building a 275-ton motor freight boat. This will be launched about June 15. The company expects to build one or more sailing schooners of from 750 to 1000 tons.

A schooner will shortly be launched from the yard of the R. H. Howes Construction Co., Boston, at St. Mary's bay, Nova Scotia. The company is building 3-mast schooners of 360-ton net register and has 600 acres of timber holdings in the immediate neighborhood. The yard was last operated by the late James Cosman about 20 years ago.

The first concrete seagoing vessel built in the east was launched a few days ago by the Louis L. Brown Co. at its Verplanck Point shipyard near Peekskill, N. Y. The craft is a 700-ton barge and will be used to carry coal and ore.

As a result of the expansion in the shipbuilding program, the yard of the New York Shipbuilding Corp., Camden, N. J., is to be doubled; the Sun Shipbuilding Co., Chester, Pa., will erect four new ways; and the Newport News Shipbuilding & Drydock Co., Newport

News, Va., will enlarge its yard and erect a new boiler shop.

The first composite wood and steel ship built for the Emergency Fleet corporation was launched at Jacksonville, Fla., a few days ago. She was named the WAR CLOUD.

At Algiers, across the river from New Orleans, the Johnson Iron Works, which has been working 450 men on ship repairing, has doubled its facilities and is building six 100-foot tugs for the government, and installing machinery in 10 wooden ships.

The Union Bridge & Construction Co., New Orleans, launched May 30, its first ship for the Emergency Fleet corporation, a 3000-ton wooden hull, christened LAFORGE. Five more ships of the same size and type (Ferris) are to be constructed by this company.

The Diercks-Blodgett Co. launched its first wooden ship for the Emergency Fleet corporation the last week in May, when PASCAGOULA, a 3500-ton Ferris-type hull, was sent down the ways of the company's yard at Pascagoula, Miss. The yard in which she was built eight months ago was a swamp. The vessel is 280 feet long, 46 feet beam and 26 feet deep, 1,500,000 feet of lumber being used in her construction. She will carry four masts and 400-horsepower auxiliary engines, with which she is being outfitted at Pascagoula.

Delta Shipbuilding Co., a newly-organized firm backed mainly by Chicago capital, has obtained a site for a concrete shipbuilding yard on the industrial canal at New Orleans. It is commonly understood that the Portland Cement association is back of the new company. S. A. Krajicek and A. L. Tull, both of Chicago, selected the site.

The Shell Banks Shipbuilding Co. has been organized recently at Chickasaw, Ala., with Capt. Varian C. Scott president.

The Lone Star Shipbuilding Co., Beaumont, Tex., launched the LONE STAR, a Ferris-type wooden hull of 3500 tons,

for the Emergency Fleet corporation, at Beaumont, June 1. This is the third Ferris-type hull launched for the government at Beaumont in three weeks.

Universal Shipbuilding Co., Galena, Tex., launched the 3500-ton wooden ship BASCO, May 15. The hull is of the Ferris type of construction and was built for the Emergency Fleet corporation. She is a sister ship to NACOGDOCHES, launched April 5.

The North Carolina Shipbuilding Co. has two wooden steamers about half completed at its yards at Morehead City, N. C.

The Midland Bridge Co., Houston, Tex., has launched one Ferris-type wooden hull and is at work on five more vessels of the same class. These boats average 3000 tons each.

First yard for the construction of concrete barges in Texas is to be established by Otto P. Kroeger, El Paso, who has taken an option on a tract fronting 700 feet on Turtle Cove channel, Harbor island, Arkansas Pass, from the Arkansas Harbor Terminal railway and the Arkansas Pass Channel & Dock Co. Mr. Kroeger, who spent most of the winter in San Francisco, studying construction of the concrete ship FAITH, launched there this spring, plans to build concrete oil barges 250 x 50 feet for handling fuel oil between Mexican and gulf ports.

Rieboldt, Wolter & Co., shipbuilders, Sturgeon Bay, Wis., have been succeeded by the Universal Shipbuilding Co. The latter company has been organized to take over the plant at Sturgeon Bay including a shipyard and floating drydock, and the dredging and dock building facilities.

The shipping board has let contracts for 10 steel ships of 3500 tons each to the McDougall-Duluth Co., Duluth. The contracts call for the delivery of all the vessels in 1919. Contracts have been let by the government to the Baltimore Dry Docks & Shipbuilding Co., Baltimore, for constructing six steel tankers of 6000 tons each.

Late Decisions in Maritime Law

Legal Tips For Ship Owners and Officers

Specially Compiled for The Marine Review

By Harry Bowne Skillman

Attorney at Law

THE right to construct bridges over navigable streams was the point in issue in the case of *Chicago Transportation Co. v. Pennsylvania Co.*, 246 *Federal Reporter* 190. The court said that the power of the states to legislate with reference to navigable streams wholly within their jurisdiction, where congress has not already legislated to the contrary, is supreme. The *Chicago Transportation Co.* had erected a bridge across the Chicago river, and, speaking with reference to this river, the court said, "The Chicago river is wholly within the state of Illinois. In 1890 congress assumed jurisdiction and control over the Chicago river for the purposes of commerce and navigation. The power to permit the construction of a bridge over the river still remains in the state of Illinois, or its municipal agents, but under act Sept. 19, 1890, c. 907, 7, 26 Stat. 454, congress having assumed control over the river, a bridge could not be constructed until the proposed location and the plans therefor were first submitted to and approved by the secretary of war, in the interest of commerce and navigation. * * * The state has the power to authorize the construction of the bridge; the secretary of war had the power to permit or to refuse to permit the bridge to be built, his discretion being controlled by the effect the proposed bridge would have upon commerce and navigation. It follows that two permits are essential to the construction of such bridges, one by the state or its authorized agent, and the other by the United States government, through the secretary of war. The respondents have secured both. The bridge was therefore duly authorized, and was a lawful structure."

In the case of *ELLEN LITTLE*, reported in 246 *Federal Reporter* 151, it appeared that owing to conditions created by the European war, there were in Pernambuco, Brazil, whence the boat sailed, many Germans who were desirous of getting to this country. The probability of stowaways being recognized by the master of the boat he directed the mate to search the vessel for them before sailing, which search was made. After several days at sea the mate learned of the presence of a stowaway who had been secreted in the boat by two German members of the crew, but he did not report the fact to the master, and on arrival of the boat at a port in this country the German stowaway was smuggled ashore without the mate's knowledge. The master suspected the presence of a stowaway but took no steps to ascertain the truth. Federal officers learned of the landing of the German, arrests of members of the crew were made, and the boat delayed

a few days and put to expense. The question involved was whether the action of the mate in allowing a small boat in which the stowaway was landed to lie alongside the schooner, and in not reporting the stowaway, was such misconduct as to constitute an offense under revised statutes, section 4596, and to therefore work a forfeiture of wages. The court held that in view of the fact that the master did not discharge the mate, and that no entry was made in the log, and the further fact of the master's failure to follow up his suspicion about a stowaway, it could not be said that the mate was guilty of any offense, and hence there could be no forfeiture of wages. However, the court said that "considering that, as he knew, a substantial crime, involving his vessel, was likely to be committed and that he did nothing to prevent it, I do not think his neglect can be passed over." The court then decided that of the loss which the vessel sustained by being delayed, \$50 might be charged against him and be deducted from his wages.

* * *

Under the Harter act, in order for shipowners to avail themselves of the exemption from liability for errors and management of navigation, the burden is on them to prove affirmatively that the vessel was seaworthy at the beginning of the voyage or that due diligence had been used to make her so. The theory of the law, it was held in the case of *CARISBROOK*, 247 *Federal Reporter* 583, is that when the owner can show that he has discharged his duty of providing a ship that is in all respects seaworthy and properly manned, equipped, and supplied for the voyage, or that he has used due diligence to this end, he shall then be relieved from errors of navigation and management on the voyage. The question of seaworthiness is held to be whether or not the vessel is reasonably fit to carry the cargo which she has undertaken to transport. The evidence in this case was held to show that due diligence was exercised by the owner to make the vessel seaworthy at the beginning of the voyage.

* * *

Article 16 of the international rules requires that vessels navigating in a fog shall go at a moderate speed, having careful regard to the existing circumstances and conditions. The steamer *SAGAMORE*, length 430 feet, beam 47 feet, normal speed 12 or 13 knots, ran into a dense fog about half an hour before collision with a fishing schooner, and being in part of the ocean where her officers well knew that fishing vessels were usually found, and where special precautions for discovering and avoiding

them were necessary, her speed was reduced from 12 or 13 knots to slow speed until a single blast of the horn of the fishing schooner was heard, a few moments before the collision. In the opinion reported in 247 *Federal Reporter* 743, it was said that under the international rules a steamer is bound to use only such precautions as will enable her to stop in time to avoid a collision, after the approaching vessel comes in sight, provided such approaching vessel is herself going at the moderate speed required by law, and that the lowest rate of speed consistent with good steerageway seems to be regarded as the "moderate speed" required. Speaking further, with reference to a lookout, it was said that a lookout is both the "eyes and ears of a ship," and that the denser the fog and the worse the weather the greater the cause for vigilance. A ship can not be heard to say that a lookout was of no use because the weather was so thick that another ship could not be seen until actually in collision. Great difficulty in seeing does not justify abandonment of efforts to see, but, on the contrary, requires the stationing of men "to see if they can see."

* * *

The tug *JOHN SCULLY* took out two barges, and, on the tail barge going adrift, abandoned it and went ahead, the captain being convinced that any other procedure would result in the loss of the forward barge, which had been leaking since commencement of the voyage, with all on board. In the case of *Atkinson v. Scully*, 246 *Federal Reporter* 463, it was said: "The sole question is whether the master should have started on his journey with the knowledge that the tail barge was leaking. * * * I think the trouble in this case is that some men of the sea become indifferent to danger. They do something so many times without disaster that they no longer appreciate its dangers, just as the seasoned New Yorker in crossing a busy thoroughfare will take a chance which would horrify a country visitor. And so in this case the captain evidently was indifferent to possible danger when he started from Hampton roads with a leaky barge." It was held that tugs are held to a high degree of diligence in endeavoring to save a tow which has gone adrift, and that it is no excuse that weather at beginning of the journey and for some time thereafter was good, as no one can surely predict what the weather at sea will be three days hence. Prudence requires foresight and safeguarding against bad weather and rough seas; if a tug takes out a leaky barge, she must be held to all the proximate results of such conduct.

Soo Canal Report

Freight shipments through the Soo canal during the month of May showed a greater total by 2,596,153 net tons than those for May 1917. Shipments through the American and Canadian canals were 11,404,045 net tons, compared with 8,807,892 tons in May, 1917. The corresponding figures for the years 1916 and 1915, were, respectively, 12,293,476 and 7,348,567 net tons. Up to June 1, the 1918 movement totals 11,826,534 net tons, an increase of 2,760,352 net tons over 1917, with shipments of 9,066,182 net tons. Compared with the June 1, 1916, figure of 14,508,838 net tons, the loss is 2,682,304 net tons.

In May, 8,859,750 net tons were shipped through the American canal, and 2,544,295 net tons through the Canadian canal. The grain movement in May amounted to 10,820,022 bushels, and for the period ending June 1, the total was 17,344,698 bushels, a loss of 41,169,940 bushels compared with shipments to June 1, 1917, of 58,514,638 bushels.

Detailed figures covering shipments to June 1, 1918 and 1917, are shown in the following table:

EAST BOUND

	To June 1, 1917	To June 1, 1918
Lumber, M. ft. B. M.	23,524	35,647
Flour, barrels	876,160	858,070
Wheat, bushels	40,956,059	7,074,219
Grain, bushels	17,558,579	10,270,479
Copper, net tons	12,210	14,236
Iron ore, net tons	5,436,467	8,939,350
Pig iron, net tons		
Gen'l merchandise, net tons	12,068	10,403
Passengers, number	274	286

WEST BOUND

Coal, soft net tons	1,364,435	1,966,051
Coal, hard, net tons	334,802	166,155
Iron ore, net tons	15,883	14,671
Mig'd. iron and steel, net tons	15,047	7,917
Salt, net tons	119,279	12,835
Oil, net tons		31,671
Stone, net tons		50,454
Gen'l merchandise, net tons	169,675	54,641
Passengers, number	246	327

SUMMARY

Vessel passages, No.	2,444	2,974
Registered tonnage, net	7,474,266	9,341,015
Freight:		
Eastbound, net tons	7,148,838	9,522,139
Westbound, net tons	1,917,344	2,304,395
Total freight, net tons	9,066,182	11,826,534

Handling Materials at Hog Island

(Concluded from Page 279.)

aftermost towers are 53 feet high, the next set 59 feet, the next 66 feet and the forward set 59 feet.

The construction of the towers, together with their foundations, sway bracing, etc., is clearly indicated in Fig. 1 which also shows details of the ways and the arrangement of the derrick booms. As this illustration indicates, the distance from the inner line of derrick tower columns

to the side of the ship is 20 feet on the side where the spur track enters and 4 feet on the other. The ship itself is 58 feet beam. The keel blocks are 5 feet high; in other words, the 1½-inch keel plates are 5 feet above the floor of the ways. These boats, of the 7500-ton type, are 40 feet deep to the shelter deck. From the shelter deck to the bridge deck their height is 8 feet 6 inches and from the bridge deck to the boat deck 7 feet 10 inches, making the total height of the ship above the keel plates 56 feet 4 inches.

The derrick booms and masts are Douglas fir 14x14 inches and 16x16 inches respectively. The masts are 40 feet and the booms 80 feet in length. These derricks have a capacity of five tons each. The booms are trussed with steel rods as shown in Fig. 1. Electric hoists, which are located in hoist houses on the tops of the derrick towers, were furnished by the Otis Elevator Co., New York. Each hoist is driven by a 37-horsepower, 60-cycle, 3-phase, 440-volt motor. The operators' pulpits are so arranged that each derrick man has an unobstructed view of the territory served by his machine. Only the electrical equipment was furnished by the Otis Elevator Co. The hoist mechanism itself was built by the American Hoist & Derrick Co., St. Paul.

Each Slip Fully Covered

Fig. 3 shows the field served by each derrick. The numbers, 1, 2, 3 and 4, indicate the number of derricks serving various areas over the ship. It will be noted that practically the entire ship is reached by two derricks and that the important areas are served by from three to four. Fig. 4 shows clearly how the derricks are employed for unloading the steel and delivering it to the proper point on the ship. The whole arrangement is relatively inexpensive and simple and at the same time it is believed that it possesses maximum effectiveness.

As previously mentioned, a stiff-leg derrick is set up on the ground at the head end of each set of ways for the purpose of handling and assembling extra heavy parts such as bulkheads which are too large to be assembled in the fabricating shops in the interior of the country. These ground derricks, which are of the stiff-leg type, have 66-foot booms and 36 foot masts. The booms are 14x16 inches and the masts are 16x16 inches. These derricks have a capacity of 12 tons each.

Each of the seven fitting-out piers is amply equipped with traveling

cranes of the gantry type. The first, third, fourth, fifth, sixth and seventh piers are each provided with four 25-ton gantry cranes. The second pier is equipped with four 35-ton cranes and in addition is provided with a 100-ton fitting-out crane under which a ship may be floated. This crane consists essentially of a supporting tower on the pier side, with a lattice truss over the ship and a relatively light lattice column supporting the outer end of the arm. The whole forms a gallows frame under which the ship is floated. The crane has a span of 110 feet over the ship and its height from mean low water to the under side of the lower chord of the supporting truss is 111 feet. This crane is equipped with a 100-ton electrically-driven main hoist and a 25-ton auxiliary hoist.

From the foregoing it is seen that all of the ship-construction material at the Hog Island yard is handled by a simple combination of railroad freight cars, standard locomotive cranes and plain derricks. In its elements, the scheme is relatively simple and therefore efficient. On account of the great size of the plant, however, a large number of units have been provided and the resulting operations are complex in the aggregate. An exceedingly high order of ability is necessary for their efficient administration.

Lake Erie Receipts

Out of a total of 8,792,231 tons shipped from upper lake ports in May, Lake Erie ports received 5,972,574 tons, as shown by figures compiled by THE MARINE REVIEW. The balance on dock June 1 was 5,650,059 tons against 4,121,305 tons on June 1, 1917. Detailed figures are:

Port	Gross tons
Buffalo and Port Colborne	968,713
Erie	190,034
Conneaut	854,101
Ashtabula	1,442,655
Fairport	268,799
Cleveland	1,184,031
Lorain	481,946
Huron	187,366
Toledo	303,983
Detroit	90,946
Total	5,972,574

May Ore Shipments

Shipments of iron ore from the Lake Superior district last month were 8,792,231 tons, the largest ever recorded in any May in history. Detailed figures follow:

Port	May, 1918	To June 1, 1918
Escanaba	655,495	655,495
Marquette	495,043	505,751
Ashland	898,147	898,147
Superior	2,088,029	2,187,591
Duluth	3,055,083	3,112,074
Two Harbors	1,600,434	1,669,043
Total	8,792,231	9,028,101
1918 increase	2,508,619	2,532,957

On the Coasts, Lakes and Rivers

What's Doing and Who's Doing It

Great Lakes Trade Now in Full Swing

BY M. L. SHANER

THE New York barge canal was officially opened May 15, and on May 30 the steamer W. H. FOLLETTE arrived in Buffalo. She was the first boat to make the entire run from New York to Buffalo through the new canal. Several barges which she had in tow as far as Lockport remained there for repairs. The steamer E. T. DOUGLASS and barges No. 7, No. 8, No. 19 and No. 33 have also made the trip through the canal from New York to Buffalo. It is expected that the eastbound traffic will soon become brisk, as it is understood that most of the grain going east from Buffalo will be shipped through the canal.

* * *

Work is being rushed at the Buffalo drydock these days. The steamer J. H. WADE is being cut in two and equipped for salt water service. The CHARLES S. NEFF is also being made ready for transfer to the coast. In addition, the steamer CHEROKEE is being extensively repaired and various new ships are being constructed.

* * *

Arrangements have been made for the construction of a new machine shop in connection with the present plant of the Toledo Shipbuilding Co. This is to take care of the work incident to building 20 new ships for the government. The company plans to launch a ship every three weeks.

* * *

The One Hundred Dollar club has been organized by the crew of the steamer MARIPOSA. The members of the club have agreed to buy enough war savings stamps each month to make a total of \$100 for each member by the end of the sailing season. To protect the ship against alien enemies is to be one of the duties of the club. To do this the members of the club will report to the captain any person heard making disloyal remarks. They have also agreed as far as possible to live up to the orders of the food administration.

* * *

Much interest is being taken in the donations made by the various vessel crews to the war chest fund. Monday, June 4, was a record day, inasmuch as the mail on that day brought more than \$5000 to the Cleveland office of the Lake Carriers' association for this fund.

* * *

The water is lower than it was last season and up to date the ore boats are carrying about 250 tons a trip less than they did in 1917. However, most of the ore carriers have made more trips than they did in 1917, which has resulted in

a gain in shipments over those of last year.

* * *

On May 19, about 10:30 in the morning, the steamer BELGIUM, upbound, light, ran into the steamer D. M. PHILBIN, downbound and ore laden, off Whitefish point. This was the first collision to occur in this section this season. The BELGIUM turned back to the Soo, and from there went on to Superior where she went into drydock. In addition to 20 damaged plates, 10 of which had to be replaced, she had a dozen broken frames. It was estimated that two weeks would be necessary for repairs. The steamer PHILPIN, after making temporary repairs at the Soo, delivered her ore cargo at Lorain and from there went on to Cleveland to make repairs. She had a hole 10 feet long and 8 feet wide in the starboard side, near No. 16 hatch.

* * *

The steamer DISPATCH, belonging to the Cedar Point Resort Co., went on the ways at the Lake Erie Drydock Co.'s plant for repairs on May 26. She sprang a leak the preceding Friday while combating a heavy sea on her trip from Huron to Sandusky.

* * *

Director General Charles M. Schwab of the Emergency Fleet corporation ordered 130 steamers on Monday, May 29. Of these the Toledo Shipbuilding Co. will build 16, the American Shipbuilding Co. 60, the Great Lakes Engineering Works 24, and the Manitowoc Shipbuilding Co. 12. The remainder will be turned out by the Saginaw Shipbuilding Co., and the McDougall-Duluth Co. and the Globe Shipbuilding Co. of Duluth.

* * *

The Liberty Shipbuilding Co. has increased its capital stock from \$100,000 to \$500,000. The company is planning to construct concrete ships and to this end is building a plant on the lake front at the foot of East Fortieth street, Cleveland. The boats, six of which have been promised for this year, will be operated between Cleveland and the coast by a subsidiary company.

* * *

The Foundation Co. of Port Huron has secured permission of the navy department to construct large bulkheads in the St. Clair river to fill in some land, giving more room for laying keels. In addition to this improvement, which will cost \$600,000, new mills and other shops, costing \$200,000, will be started in a short time. The company has a contract for 10 trawlers for the French government, the keels

of which will be laid at once, and expects to get an order from the United States government.

* * *

Capt. W. W. Smith, marine superintendent of the Pittsburgh Steamship Co., is at work floating the steamer CORT which was sunk at the head of Lake Erie last winter. The CORT, which was assisting the fleet through the ice fields at the head of the lake, on Dec. 17 backed into the path of the steamer MIDVALE which was downbound with a cargo of ore. The collision occurred near Bar Point. Former Judge W. L. Day, who was appointed arbitrator in the MIDVALE-HENRY CORT collision, held the CORT at fault.

* * *

The American Shipbuilding Co., Cleveland, is ahead of schedule in turning out boats for the Emergency Fleet corporation. At the rate they are being dropped into the water a number of steamers scheduled for delivery in 1919 should come out this season. Tuesday, May 21, steamer No. 533 was launched at the Superior yard and on the following day steamer No. 475 was launched at the Cleveland yard and steamer No. 223 at the Wyandotte yard. The three steamers will be ready to leave for the coast in about 30 days.

* * *

Charles M. Schwab, director of shipbuilding for the Emergency Fleet corporation, Vice President Charles Piez, and other officials of the corporation inspected the yards of the Detroit Shipbuilding Co. at Wyandotte and the Ecorse yards of the Great Lakes Engineering Works on Wednesday, May 22.

* * *

The steamer J. G. McCULLOUGH, formerly a lake package freighter, has been sunk by a mine or torpedo in foreign waters. It was reported that all hands were saved except Engineer Dougherty. The steamer was built by the Union Dry Dock Co. of Buffalo in 1890 under the name of the S. C. REYNOLDS. She was renamed the J. G. McCULLOUGH when she was later taken over by the Great Lakes Transit Corp.

* * *

The case of the steamer SQUIRE, which struck the dock at the Concrete elevator, Buffalo, while in tow of two tugs last season, was reopened May 23. In the original hearing of the case Judge Hazel in the United States district court held that the SQUIRE and the tugs were equally at fault. A rehearing was obtained before Special Commissioner George Clinton, Buffalo, by Harvey D. Goulder, Cleveland, admiralty lawyer, Charles O. Johnson,

vessel owner, and Attorney Harvey L. Brown of Buffalo. At the rehearing damages were allowed the SQUIRE.

* * *

The port of Buffalo will in the future have two harbor masters to keep boats moving properly and to keep a closer watch on things in general about the river and harbor. This is owing to increased traffic conditions in the Buffalo

river and harbor. The city councilmen have appointed Cornelius Coughlin former assemblyman to the position of harbor master No. 2. Capt. John Burns is No. 1, having been on the job for several years.

* * *

Fifty-one steel and 20 concrete barges have been ordered for the new barge canal, General Manager G. A. Tomlin-

son of the barge lines has announced. The steel vessels will have a carrying capacity of 600 tons each and the concrete of 500 tons each.

* * *

The Lake & Ocean Shipbuilding Co. of Cleveland with \$5000 capital was incorporated at Columbus, May 20. J. S. Kohn and L. M. Young are the incorporators.

Along the Atlantic and Gulf Coasts

THREE-MAST schooner **CHARLES B. WIGGINS**, launched at Kennebunk, Me., a few weeks ago, has been sold by Benjamin Smith, Gloucester, Mass., to La Morue Francaise et Sechandese Fechamp and transferred to French registry at Boston. Her name was changed to M. F. A. with St. Pierre, Miquelon, as hailing port. The vessel will be employed in transporting fish from Newfoundland to St. Pierre.

* * *

Two-mast schooner **POCHASSET** has set a record for long passage between Nova Scotia and Boston. She was six months in covering a distance of 300 miles. The vessel ran into bad weather, sprung a leak and had to put into Boothbay Harbor, Me., for repairs.

* * *

After having been idle four months at Boston the Norwegian bark **SHAKESPEARE** has been chartered to load coal at Norfolk for Rio Janeiro at \$19.50 per ton. Other Norwegian square-riggers at Boston are being placed in the South American trade to release steamships for transatlantic service.

* * *

The new steam trawler **KINGFISHER** is equipped with wireless in order to communicate with her owners in Boston regarding the market and to indicate her movements and success while on the fishing grounds.

* * *

Recently the Boston city council inaugurated a campaign for shipbuilders and 12,000 recruits were secured although only 8000 were actually needed. The housing problem for these men is not acute as the majority live in the city or suburbs. There are upward of 30 plants in the district that can be put on vessel work and most of these are busy.

* * *

An oil carrier, the **GEORGE W. BARNES**, was recently launched from the Fore River plant of the Bethlehem Steel Corp. at Quincy for the Pan American Petroleum & Transport Co., New York. The **BARNES** has deadweight capacity of about 9000 tons.

* * *

A harbor and bay tug, **PRISCILLA**, has been launched at Thomaston, Me., by C. A. Morse for the Doane Towboat Co., Boston. She will be used at that port. **PRISCILLA** is 78 feet long.

* * *

British steamer **JOHN L. CANN** inaugurated a new freight service between Yarmouth, N. S. and Boston with H. F. Hammond as local agent. Recently the steamer was sold by H. Cann & Co.,

Yarmouth, N. S., to New York interests for general towing. The vessel is 98 feet long and her tonnage is 166 gross.

* * *

Shipbuilders at Bath, Me., are living in the open because the city cannot meet the housing problem and congress has been appealed to for an allowance that will help remedy matters. A year ago this city had a population of 10,000. Today it is about 15,000. Several hundred workers are living in tents lighted by electricity. Cooking is done by means of the same agency.

* * *

An American bark has arrived at Boston 114 days from Calcutta with a cargo of 10,000 bales of jute for a local factory. Practically all transportation of that nature is now carried on in square-rigged craft in order to release steamships.

* * *

Commonwealth Pier, Boston, has been taken over by the navy and war departments in connection with oversea transportation of men and supplies. This pier is 1200 feet long and 200 feet wide with 40 feet of water alongside. It was built for the Hamburg-American line and the White Star line by the state. When the war broke out the German-owned **AMERIKA** and **CINCINNATI** were laid up there until removed to special quarters at Federal wharf. The state will be paid by both the navy and army on a pro-rata basis.

* * *

The maiden trip of the American steamship **TUCKAHOE**, built at Camden, N. J., in 37 days, was from Baltimore to Boston where the ship arrived in 43 days from the date her keel was laid. She carried a 5000-ton cargo. The ship continued to break records, for the first cargo was loaded in three hours with the freighter ready for sea, and the N. E. Fuel & Transportation Co., at Boston, discharged the consignment at rate of 1000 tons per hour. Because the **TUCKAHOE** is making such quick dispatch some of the crew requested to be paid off as the stops in port are too brief.

* * *

Satisfactory progress on the war embarkation plant, a \$25,000,000 project at Boston, is reported by Maj. C. R. Gow, superintendent. Ten thousand men are employed and 18 miles of railroad tracks have been laid. The main building of eight stories will be 1638 feet long and 250 feet wide with tracks and an unloading shed connected by overhead bridges. Three dredges are deepening the reserve channel to 40 feet and six ships will be accommodated at berths

alongside the shed which is to be used largely for export cargoes. Already steamships are landing building material on the site and foundations have been sunk to a depth of 40 feet preliminary to work on the reinforced concrete construction.

* * *

Four-mast schooner **R. T. GREEN**, built at Chelsea, Mass., last winter, has been sold to the Pittsburg Coal Co., New York. She will transport fuel from Virginia ports to New England cities.

* * *

LeBlanc & Railey, Ltd., one of the largest insurance firms in the south, with headquarters in New Orleans, recently celebrated their seventeenth anniversary in the insurance business.

* * *

Jetties at the mouth of the Brazos river, Texas, are to be repaired and improved and the channel deepened. D. M. Picton & Co., Houston, have been given the contract, which involves the dumping of 360 carloads of rock on the jetties.

* * *

Rockport, at the head of Corpus Christi bay, Texas, only a fishing village for years, now has a shipyard employing 500 men. More than 300 carloads of material have arrived there this spring.

* * *

The International Marine Iron Works, Houston, Tex., is manufacturing 88 steel propellers for wooden freighters now under construction at gulf coast shipyards.

* * *

Pascagoula, Miss., which comprises the twin ports of Pascagoula and Moss Point, has issued \$40,000 in bonds to be used in acquiring additional river frontage and the building of covered docks, wharves and warehouses in preparation for commerce and shipbuilding after as well as during the war. The combined ports have a water frontage of five miles along the Pascagoula river suitable for shipbuilding. Four large plants are building ocean tonnage there, with 28 ships of 3000 to 3600 tons under construction. Eight steel ships of 9500 tons each also are being built. All-water transportation from the Alabama iron and coal fields has been of great aid to the shipbuilding industry at Pascagoula. The larger companies, such as the Dantzer Shipbuilding & Dry Dock Co., the Hodge Ship Co., the International Shipbuilding Co. and the Dierks-Blodgett Shipbuilding Co., have made such heavy

investments in their plants—built primarily to furnish ocean tonnage for the United States in war—that they will continue shipbuilding on the same or an even larger scale after the great conflict is ended.

* * *

The Jahncke Shipbuilding Co., operating a yard at Madisonville, about

30 miles across Lake Pontchartrain from New Orleans, has built a branch railroad line from the Illinois Central to its shipbuilding plant. Though Madisonville is more than 200 years old, it never has had a railroad.

* * *

The Sixth District Shipbuilders'

association, to include owners and representatives of plants in Houston, Beaumont, Orange, Morgan City and Rockport, Tex., has been organized, with R. J. McBride, Beaumont, head of the shipbuilding firm of McBride & Co., as chairman until permanent organization is effected. Headquarters will be in Beaumont.

Up and Down the Pacific Coast

OF 19 Japanese steamers to be taken over by the shipping board at Seattle, by agreement with the Japanese government, 13 arrived in May. These vessels came fully laden from the Orient with the result that Puget Sound's Oriental trade has established a record during May that has never before been equalled. Arrivals from Japan and China in May numbered 33 steamers of 105,630 net tons and sailings for the Far East numbered 23 of 81,066 net tons. The extensive storage facilities of Seattle and Tacoma have been taxed by the great fleet of merchantmen from the Orient.

The Japanese steamers taken over by the United States are being in turn distributed among chartering and operating firms. They are being sent from here to the Hawaiian islands, the West Coast and elsewhere where required. The others to be operated by the Emergency Fleet will arrive early in June.

* * *

Loss estimated at close to \$2,000,000 was done to the steel shipbuilding yards of J. Coughlan & Sons, Vancouver, B. C., early on the morning of May 15. The fire started in the boiler house and besides that structure destroyed the outfitting wharf and various department buildings. Heavy damage was also done to ways No. 3 and No. 4, occupied by the steel steamships WAR CHARIOT and WAR CHARGER, both well advanced in construction. The WAR CHARIOT twisted and extensively damaged, lies half submerged at the outer end of the ways. Announcement has been made that reconstruction will be begun without delay. The yard's construction program will be seriously delayed but every effort will be made to execute contracts promptly. The origin of the fire has not been determined.

* * *

Ice conditions in Bering sea are more serious this spring than for many years. During the month about 25 cannery ships have been imprisoned in the great floes at the entrance to Bristol bay, where many canneries are located. The ship TACOMA, of San Francisco, has been sunk with her cargo, and the ship ABNER CUBURN and bark W. B. FLINT of Seattle, have been carried aground and damaged. The coast guard has sent a tender to the assistance of the fleet. It is believed that the damage will be heavy and the pack reduced because of the loss of supplies.

* * *

French and Norwegian interests are negotiating for the purchase of both

steel and wooden tonnage under construction in British Columbia and on Puget Sound. The Pacific Construction Co., Vancouver, B. C., has been offered contracts for five 8800-ton steel steamers for French companies and the deal is now awaiting the approval of the Canadian government. It is reported that a price of \$215 per ton is being offered which is \$15 per ton more than is being paid by the Dominion government.

* * *

Widespread interest has been shown in the performance of the first concrete steamer built on the Pacific coast. The FAITH has just completed her first voyage from San Francisco to Puget Sound. The vessel was six days making the distance which under ordinary conditions should have been done in four days. However, unusually heavy weather and head winds were met and in the circumstances the owners of the vessel express entire satisfaction with her showing. Government officials were aboard to make observations and to report to the Emergency Fleet corporation.

* * *

Labor troubles have practically stopped work in the British Columbia steel yards and government officials have not yet been able to bring about a compromise. Members of the metal trades are asking for a \$6.60 minimum wage and a 44-hour week. Some of the yards have adopted a new scale but generally the men claim it is unsatisfactory and the matter is still far from settlement although the imperial munitions board is attempting to get employers and the men together.

* * *

While many wooden steamers of the Ferris 3,500-ton type are under construction at North Pacific yards, work is about to be started on the Dougherty 5000-ton type. The Grant Smith-Porter Co., Aberdeen, will begin construction of the Dougherty type early in June. The launching ways are to be extended for the new type, which are 329 feet in length. This yard is still working on the contract for eight Ferris type ships. It is expected to make a record of 55 working days on the hulls at present under construction. Three vessels have already been launched and three are on the ways.

* * *

While the Lake Washington canal, Seattle, has handled a great amount of water traffic, since the locks were completed two years ago, the first overseas steamer to enter the water-

way, passed through the locks late in May. This is the large Japanese steamship AIKOKU MARU, which is undergoing extensive repairs before being taken over by the Emergency Fleet corporation.

* * *

When the steamship VICTORIA inaugurated the Nome season from Seattle early in June she carried 60 tons of Matanuska coal, which will have traveled 8000 miles in order to reach its destination at Nenana on the Yukon river. As the crow flies, it is not more than 200 miles from the Matanuska coal fields to Nenana but under present conditions it was necessary to bring the shipment by water to Seattle and transfer it to a vessel going to St. Michael. From the latter port the coal will be sent up the Yukon to its destination. When the Alaska engineering commission completes its extensions to the Alaska Northern railroad, the Matanuska output will be shipped by rail.

* * *

The Vulcan Mfg. Co., Seattle, recently purchased by Frank Waterhouse & Co., has obtained a contract for furnishing 50 anchor windlasses and 500 cargo winches with which to equip vessels which are to be built by the Skinner & Eddy Corp.

* * *

The Norway-Pacific Construction & Dry Dock Co., which has obtained official approval of its plans, has purchased 10 acres of waterfront at Everett, Wash., where it will build its large plant. The plans call for a modern building and repair plant. Work is to be started at once on filling the site, installing ways and constructing the necessary buildings. It is announced that modern equipment will be purchased as the company intends its plant to be permanent.

* * *

The Thorndyke-Trenholme Co., Seattle, has the contract for outfitting, handling, chartering and disbursing the 40 steamships now building at north Pacific yards of the Foundation Co., for French interests.

* * *

Notwithstanding the fact that congress has passed the \$50,000,000 appropriation to be expended in housing ship workers, the problem is still a local one and it is up to Seattle to handle its own case. This is the substance of a letter received from the headquarters of the Chamber of Commerce of the United States, Washington, D. C.

Equipment Used Afloat and Ashore

Drift Bolt Driver—Saw Blade Sharpener—Electrical Dubbing Machine—
Grip Windlass—Hydraulic Plate Bending Machine—High Level Truck

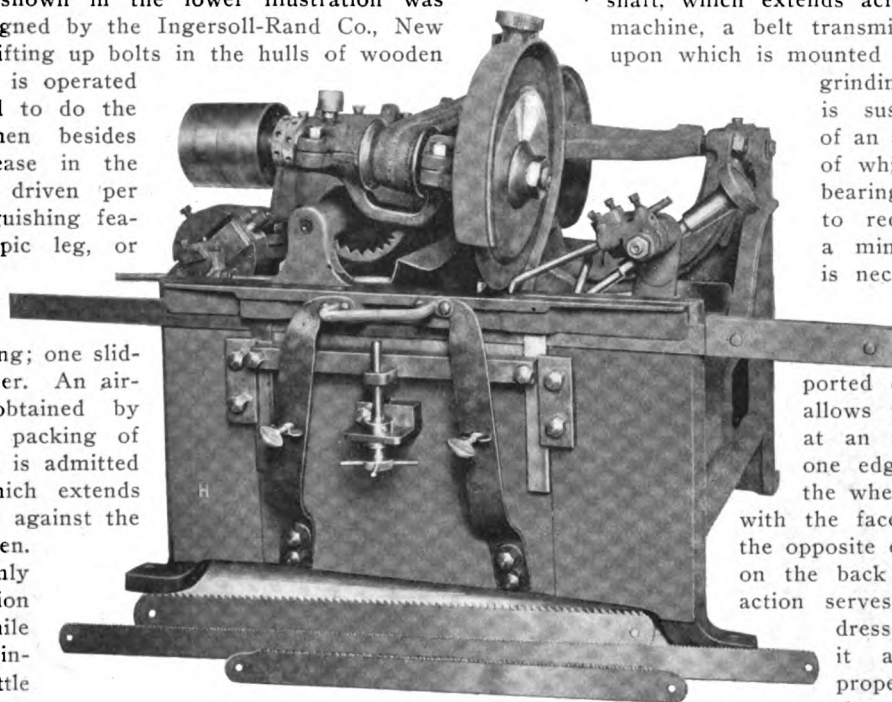
THE device shown in the lower illustration was recently designed by the Ingersoll-Rand Co., New York, for drifting up bolts in the hulls of wooden ships. The device is operated by air and is said to do the work of two men besides showing an increase in the number of bolts driven per hour. The distinguishing feature is a telescopic leg, or feed, which consists of two sections made of seamless steel tubing; one sliding within the other. An airtight joint is obtained by means of leather packing of the cup type. Air is admitted into the tube which extends it until the tool is against the bolt to be driven. The device is firmly held in this position by air pressure while in operation. A single, 3-way throttle controls both functions of the tool. The hammer element of this tool is the same as used in other pneumatic tools made by the Ingersoll-Rand Co. The new tool is said to be quite powerful and, it is claimed, will drive 1½-inch bolts up to 10 feet in length. The device weighs 90 pounds, is 55 inches long when air feed is closed and 77 inches in length when fully extended.

Saw Blade Sharpener

Some years ago when hack saw blades were made of carbon steel they were thrown away as soon as the teeth became dull. At the present time, however, when the majority of hack saw blades in use are made of high-speed steel, it is evident that the average shipyard's expenditure for blades under such conditions is comparatively high and attention has been directed to reclaiming worn blades.

To enable the consumer of hack saw blades to conserve his supply as much as possible, the machine shown in the upper illustration was developed by the Wardwell Mfg. Co., Cleveland. This machine is especially designed for sharpening hack saw blades and thin, soft-back metal cutting band saws.

The operation of the machine is comparatively simple. From the main drive



AUTOMATIC MACHINE FOR RESHARPENING HACK SAW BLADES



PNEUMATIC DRIFT BOLT DRIVER
FOR WOODEN SHIPYARDS

shaft, which extends across the back of the machine, a belt transmits power to a shaft upon which is mounted a thin, elastic-bonded grinding wheel. This shaft is suspended at the end of an arm, the opposite end of which swings in pivoted bearings, placed well apart to reduce side motion to a minimum. This feature is necessary to insure correct spacing of the teeth in the saw.

The arm is supported on a segment which allows the wheel to be set at an angle. This permits one edge or corner only of the wheel to come in contact with the face of the tooth while the opposite edge, or corner, bears on the back of the tooth. This action serves to keep the wheel dressed constantly so that it always presents the proper shape for forming the gullets of the teeth.

Two adjustments control the movements of the grinding wheel head. One governs the depth the grinding wheel is allowed to sink into the gullet of the tooth while the other regulates the amount of cut to be taken from the back of the tooth. The last adjustment is made by an adjusting screw which comes in contact at the proper time with a roll which bears on the face of a cam. This cam is adjustable for forming all the different shaped backs of teeth.

Power for the feed mechanism is derived from the main drive shaft through a worm gear to a shaft at the left-hand side of the machine. On the end of this shaft is a slotted eccentric equipped with a screw feed. This eccentric governs the feed of the blade to the machine.

The operation of the machine is said to be exact and it is claimed that as little as one-half thousandth of an inch can be removed from either the face or the back of the tooth. The machine is automatic in action and after being started it requires no further attention until the group of blades placed in position have been fed through one by one and sharpened.

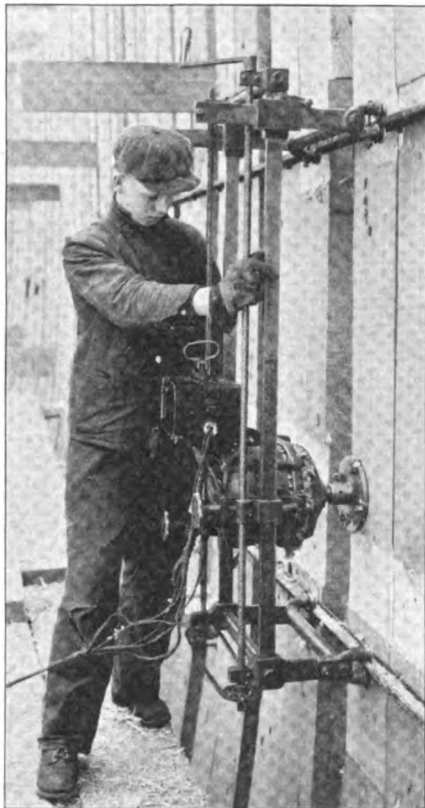
The blades are fed through the machine by a double-pawl arrangement. The two pawls work at the same time, one on each side of the grinding wheel.

The one on the right draws the blade in and starts the grinding of the first tooth while that on the left draws the blade clear of the grinding wheel and discharges it.

The machine, it is pointed out, will sharpen from 50 to 65 teeth per minute and one grinding wheel will resharpen 200 to 300 18-inch blades when taking an average cut.

Electric Dubber

An electrical dubbing machine, recently developed by Gray & Barash, Seattle, is said to save the labor of from 14 to 20 skilled workmen. It is stated that 80 per cent of the wood shipyards on the north Pacific coast are using this machine. For smoothing the surface of



ELECTRICALLY-OPERATED DUBBING-OFF MACHINE

the timbers by hand, skilled adze men are required. The electric dubber, shown in the accompanying illustration, requires but one operator.

This machine is a mechanical means for dressing off the irregular and uneven surfaces of the frames on wooden vessels preparatory to planking. It employs a rotating cutterhead to which knives are fastened. This cutting head is mounted on the shaft of an especially constructed, alternating current motor which runs at a speed of 3600 revolutions per minute.

This motor, through the means of ball and socket joints, has a 3-point

suspension within an adjustable carriage, mounted upon two bars which are transverse to the direction of travel in dressing the surface of the boat. These transverse bars are supported at their ends by arms, at one extremity of which are grooved wheels running on annular ball bearings. These wheels ride on the bead of a standard 8-pound T rail; two of which rails form a trackway upon which the dubbing machine is moved. The rails are secured to the surface to be dressed through some convenient means, the simplest of which is by lag screws with washers. These rails are of light construction, so that they can be formed to the contour of the vessel. They take the molded shape of the surface to be dressed, thereby determining the finished surface of the part to be dubbed.

The coarse adjustment of the machine is made through a rack and pinion arrangement on the supporting arms, while the fine adjustment of the cutter head, both as to elevation and angular position, is secured through screws working through the three ball and socket joints. The lateral movement along the transverse bars is secured by the two lead screws manipulated through a removable crank. Through this system of adjustable carriage members, the machine is capable of universal adjustment within a certain range of movements, enabling the machine to be operated in a horizontal, vertical or any other position intermediate or between these two points.

Grip Windlass

The windlass shown in the accompanying illustration was developed by Charles D. Durkee & Co., Inc., New York, and embodies several new features in design and construction. The frame is designed to be as light as consistent with necessary strength, the machine complete weighing but 47 pounds. It takes up a deck space $14\frac{1}{2} \times 7$ inches.

The operation of the windlass is as follows: When the handle bar is moving in the arc marked "heave" the chain is drawn in as in ordinary practice. When it is desired to pay out the chain, the handle bar is withdrawn and the handle bar socket is thrown as far aft as it will go and pressed down with the foot of the operator. This lets the chain run out. As soon as the foot pressure is released, the chain is held automatically on the friction brake.

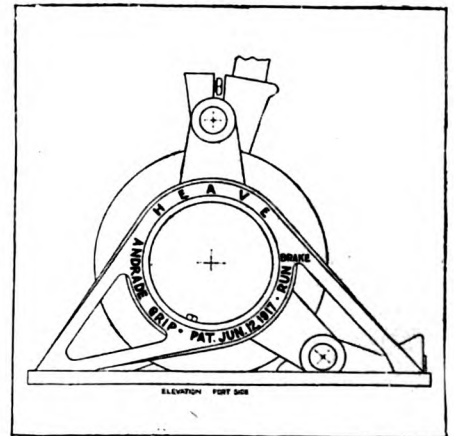
It is pointed out that this windlass will accommodate chain with any length of link. The chain is not caught on the shoulder of the link, but is held by the pressure of the pawl on the flat of the link. The wear, it is said, comes

on but one out of every four or five links, and these links vary at different times, so that the wear is equalized.

The gripping pressure between the pawl, the link and the sheave is taken by the toggles which fit under the shoulder of the sheave and no compressing strain is transmitted through the bearing of the windlass. In other words, the only strain which the main bearing has to stand is the actual pull of the chain.

The whole machine can be assembled or taken down simply by loosening or tightening two small set screws. Pawls, pawl toggles, sheave, frame and sleeve bearing all interlock and no tools whatever, except a small pocket wrench, are required to take the machine apart.

The adjustment for different thicknesses of wire in the link is made by set screws, which regulate the lost motion on the pawls. Counting the four set screws, there are only 13 pieces of metal in the whole machine. By changing the shape of the groove in the sheave and in the pawls, this machine



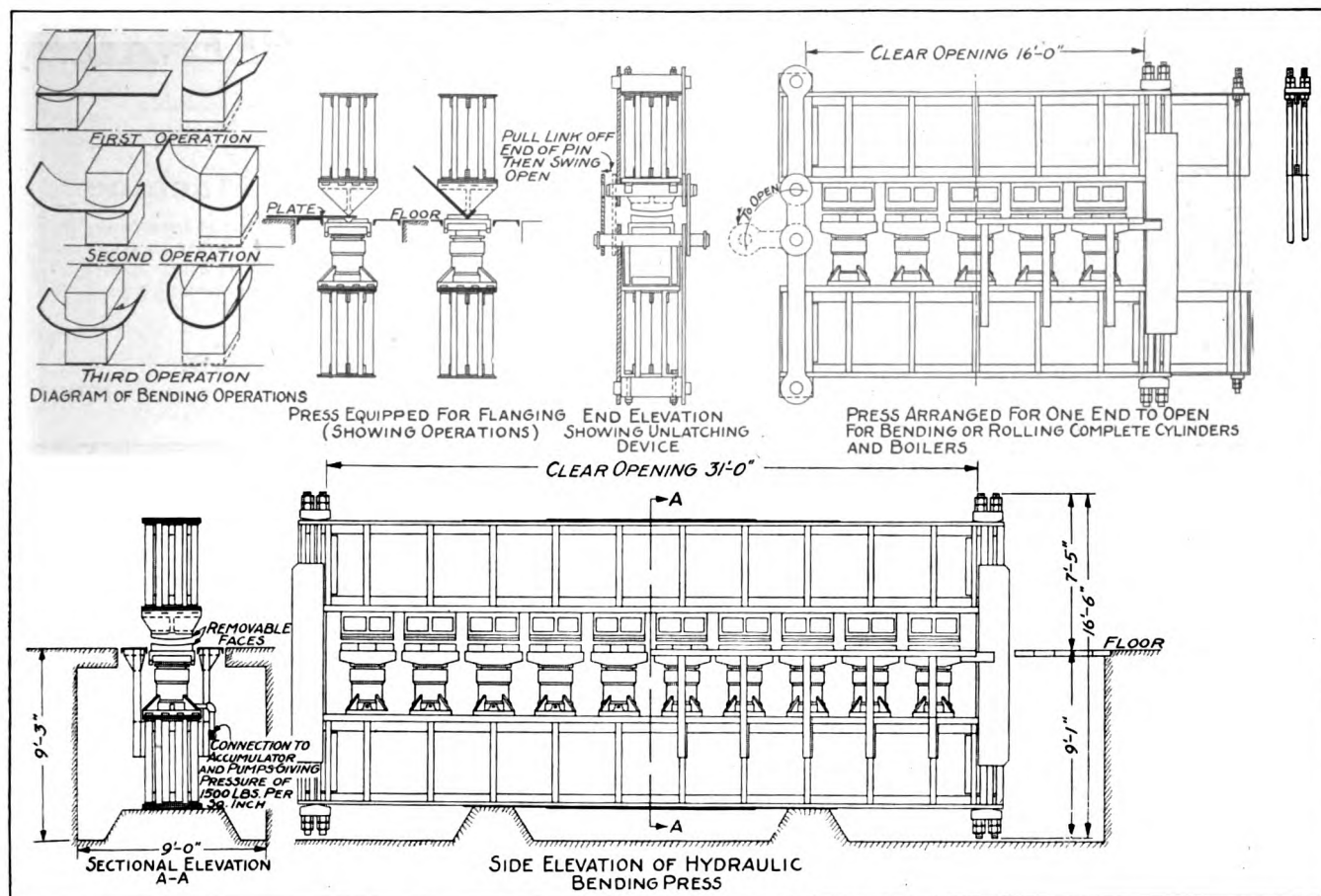
NEW TYPE OF GRIP WINDLASS

will handle rope the same as chain. The present windlass is made to handle $\frac{3}{8}$ -inch chain.

Hydraulic Plate Bending and Flanging Press

A new design of rolling press or plate bending machine, hydraulically operated, is just being put on the market by the Bailly & Allen Co., Chicago. Its primary purpose is to bend steel plates for shipbuilding purposes, though it can be used equally well for boiler and tank work.

Bilge plates for ordinary cargo ships are 6 to 7 feet wide and 24 to 30 feet long, in thicknesses of $\frac{5}{8}$ to $\frac{7}{8}$ -inch. Rolls to handle this material require a heavy upper roll about 30 inches in diameter and 32 feet long. Recent heavy demand has pushed back delivery dates and new shipyards frequently meet delay in equipping for quick construction. The new machine is con-



HYDRAULIC PLATE BENDING, WARPING AND FLANGING PRESS

structed partly in structural shops and partly in medium-sized machine shops and is designed to be built quickly.

The device is essentially an extended bulldozer. As shown in the illustration, it consists of two heavy girders, one above the other, securely tied at the ends. On the lower surface of the upper girder is mounted a continuous set of convex dies 24 inches wide, the full length of the machine, which has a clear opening of 31 feet. On top of the lower girder is a series of 10 hydraulic rams or pistons, carrying on their tops a series of concave dies 24 inches wide.

These dies have any desired curvature and can be changed at will. The plate may be formed cold to a cylinder with a radius of 36 inches or more, with the axis parallel to the long dimension of the press.

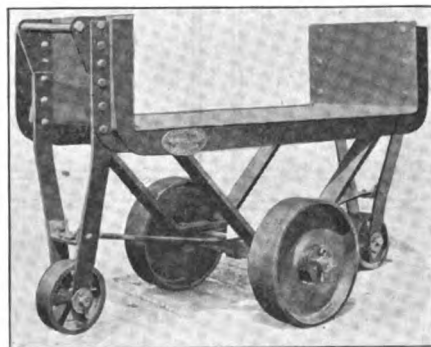
In operation the long edge of the plate is inserted and the plungers set in motion, giving the plate its cylindrical form for about 24 inches of its width. The plate then is moved 24 inches further and a second portion is formed. A series of these operations gives as much curvature as desired.

The length of time required in this machine is said to be the same as in the ordinary bending roll. The plate can be curved to within 1 or 2 inches of the edge.

In ships of the Isherwood design,

especially, gusset plates or knee braces are used where deck beams connect with the uprights of transverse girders. This requires that plates be bent at right angles to form a flange 5 to 6 inches high as a stiffener. This flanging process is accomplished by the use of V-shaped blocks and dies.

The machine also may be used for



TRUCK FOR HANDLING MATERIALS DIRECT TO MACHINES

off-setting or crimping angles which go around hatchways and for bending other bars or shapes.

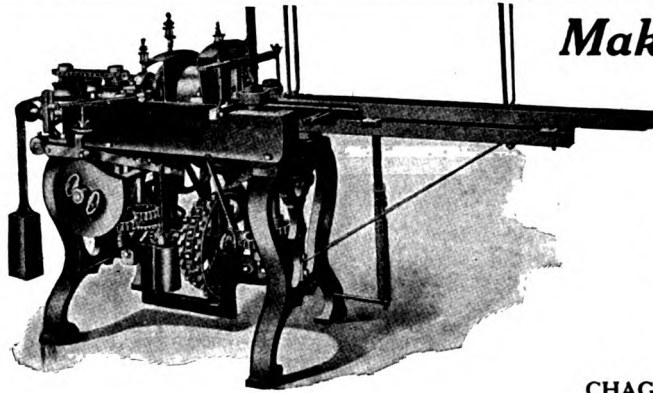
High Level Truck

A truck developed and built by the Orenstein-Arthur Koppel Co., Koppel, Pa., is shown in the accompanying illustration. The truck is designed to elimi-

nate the time lost by a machine tool operator in stooping or bending when transferring material from a truck to the machine, or from the tool to the truck. It is so constructed that the whole load is balanced on the center axle. This is provided with large diameter, wide tire, roller bearing wheels. Although of heavy design, the rated capacity being two-thirds of a ton, the truck can be easily moved fully loaded.

Marine Equipment

A well illustrated catalog is being distributed by George H. Thacher & Co., Albany, N. Y., describing and illustrating anchors and marine equipment manufactured by the company. Illustrations of 14 anchors are given. A stockless anchor, with a long shank is described which is made in 17 different sizes, ranging from one of 8 pounds to one of 500 pounds. A light suction anchor, which weighs from 15 pounds to 500 pounds, and a heavy suction anchor, which weighs from 750 to 10,000 pounds are fully described. These forms of anchors are of the standard inverted mushroom type. Other marine equipment illustrated in the catalog includes kedge anchors, grapnels, ship cleats, chocks, mooring posts, dock bitts, towing bitts, mooring rings, deck scuttles, hawse pipes and reels, capstans and propellers.



Make your own **TREENAILS**

You can save time, money and trouble by using the Ober Treenail Machine.

The Ober Treenail Machine

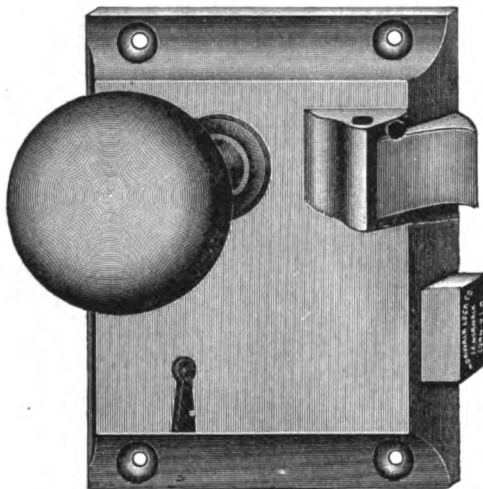
can be used for making or reducing the size of **treenails**. It's a simple, durable and rapid worker. Will turn up to 1 1/4" diameter. Capacity from 500 to 700 per hour. Special sizes made to order. These machines will also perform a great variety of other work. *Write us.*

The OBER MFG. Co.

CHAGRIN FALLS, - - - -

OHIO

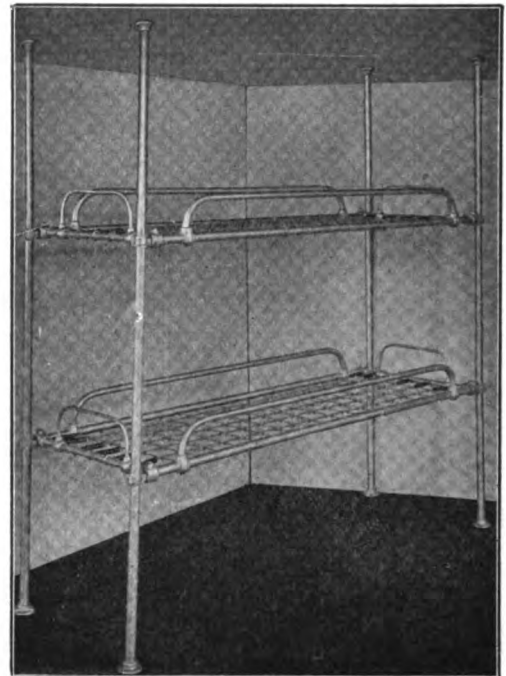
Manufacturers of **HARDWARE** for **Steel and Wood Ships**



Norwalk Lock Company
SOUTH NORWALK, CONN., U. S. A.

BERNSTEIN METAL BERTHS

*offer a complete, practical and efficient line.
A berth to successfully meet every condition on board ship.*



*Bernstein No. 5553 Third Class Steerage and Crew Berths.
Write for catalog No. 17 descriptive of Bernstein
Berths, Ship Beds, Bedding and Metal Furniture.*

Department R

Bernstein
MANUFACTURING COMPANY

3rd and Allegheny
Avenue
Philadelphia, Pa.



Durable Wire Rope Co.

93-95 Pearl St., Boston, Mass.

Durable Wire Rope will Not Rust or Rot and is not affected by
Salt Water or Climatic Conditions

FOR

Mooring Lines
Ship Rigging
Hoisting

Towing Hawsers
Dredging
Coal Pockets

Stevedoring
Boat Falls
Pile Driving

Tiller Ropes
Yacht Rigging
Fasts

BRANCH OFFICES

165 W. Lake St., Chicago, Ill.

701 St. Clair Ave. N. E., Cleveland, O.

NEW YORK AGENTS: HEGEMAN & WARD, 43 SOUTH STREET

Please mention THE MARINE REVIEW when writing to Advertisers